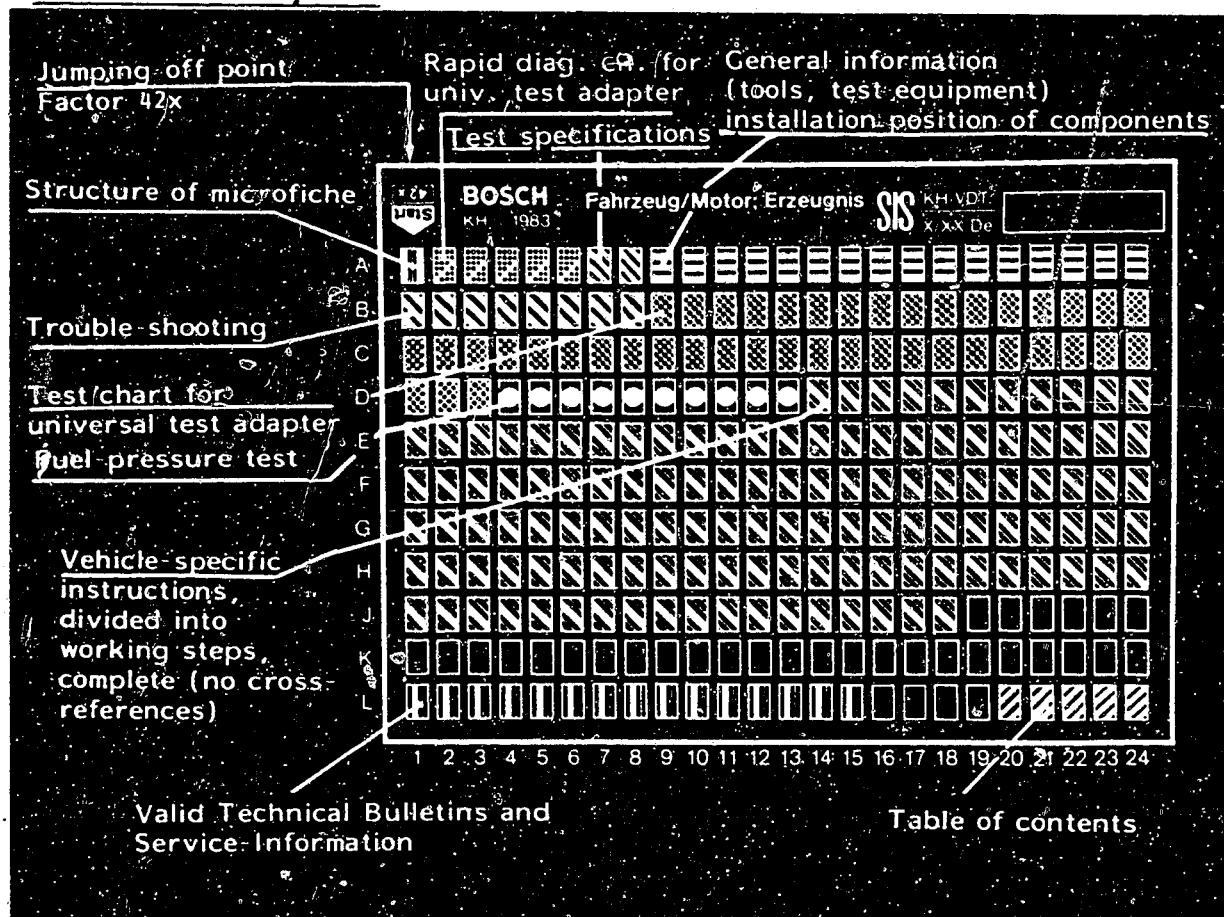


Microfiche layout



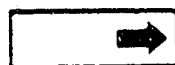
1. Read from left to right

2. Title of microfiche (appears on each coordinate)

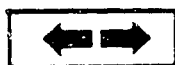
E 16	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C 6

A 1

Trouble-Shooting Plan



Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:


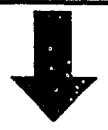







- Sequence of test steps
- Position of V and Ω program switches
- Notes on how to operate the universal test adapter or other components
- Test specifications for motortester and multimeter
- Reference to coordinates of the respective detailed testing and trouble-shooting program.

If detailed instructions and information are necessary, always proceed in accordance with the trouble-shooting charts starting on Coordinates B1/B2.



Rapid diagnosis chart for universal test adapter

Test of LE-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Remarks</u>	<u>Test specifications (reading)</u>	<u>For trouble shooting see Coordinates</u>
	V	Ω				
1	5	-	Voltage pulses from ignition coil term. 1	Shift gear to neutral, start.	Ignition pulses on oscilloscope	B 11
2	6	-	Voltage from control relay term.87	Shift gear to neutral, start.	8 ... 15 V	B 13
3	7	-	Voltage from starting motor term.50	Shift gear to neutral, start.	8 ... 15 V	B 15
4		11	Resistance of temperature sensor NTC I in air-flow sensor term. 8	---	100 ... 200 Ω	B 17
5		12	Resistance of potentiometer in air-flow sensor term. 7	Deflect air-flow sensor flap as far as it will go.	60 ... 1000 Ω	B 19
6		13	Resistance of temperature sensor NTC II term. 10 (engine temp.)	---	30 Ω ... 30 k Ω (depends on temperature)	B 21
7		14	Resistance to ground - output stage term. 13	---	0 ... 10 Ω	B 23
8		15	Resistance ground - output stage term. 25	---	0 ... 10 Ω	C 1
9		16	Resistance of full-load contact in throttle-valve switch term. 3	Accelerator in rest position	0 ... 10 Ω	C 3
10		17	Resistance of all 4 parallel-connected injection valves term. 12	Accelerator in full-load position	0 ... 10 Ω	C 5
11		18	Resistance of 3 parallel-connected injection valves term. 12 (Group I)	---	+20°C: 8.20...10.9 Ω +80°C: 8.70...11.7 Ω	C 7
12		19	Resistance of 3 parallel-connected injection valves term. 24 (Group II)	---	+20°C: 8.20...10.9 Ω +80°C: 8.70...11.7 Ω	C 9

A 3

Rapid diag. ch. for univ. test adapter

Opel Senator, Monza 3.0 E



A 4

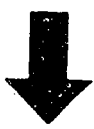



Rapid diag. ch. for univ. test adapter

Opel Senator, Monza 3.0 E



Rapid diagnosis chart for universal test adapter

Test of idle-speed control with adapter lead 1 684 463 137

Test step	Switch position		Measurement	Remarks	Test specifications (reading)	For trouble-shooting see Coordinates
	V	Ω				
1	5	-	Voltage pulses from ignition coil term. 1	Idle controller (control unit) not connected. Shift gear to neutral, start.	Ignition pulses on oscilloscope	C 13
2	6	-	Voltage from control relay term. 87b	Shift gear to neutral, start.	8 ... 15 V	C 15
3	7	-	Voltage through throttle-valve idle contact term. 2 and term. 18	Idle controller (control unit) connected. Shift gear to neutral, start. Accelerator in rest position.	8 ... 15 V	C 17
4		14	Resistance of double temperature sensor NTC II term. 67 (engine temperature)	---	30 Ω ... 30 kΩ (depends on temperature)	C 19
5		20	Resistance of idle actuator term. 62 to term. 63	---	13 Ω ... 28 Ω	C 21
6		21	Resistance of idle actuator term. 64 to term. 63	---	13 Ω ... 28 Ω	C 23
7		21	On/off ratio at idle speed Man.-shifted trans.: 775...825 min ⁻¹ Automatic trans.: 675...725 min ⁻¹	Engine at normal operating temperature. Accelerator in rest position.	30 ... 34 %	D 1

A 5

Rapid diag. ch. for univ. test adapter
Opel Senator, Monza 3.0 E


A 6

Rapid diag. ch. for univ. test adapter
Opel Senator, Monza 3.0 E



TEST SPECIFICATIONS

Idle adjustment

B7

Engine at op. temp. (approx. +80°C).

Render exhaust-gas recirculation (as of 9.83) inoperative.

● Idle speed

Manually-shifted transmission: 775 ... 825 min⁻¹

Automatic transmission

(Selector lever in position P): 675 ... 725 min⁻¹

With on/off ratio 30 ... 34 %

CO concentration

max. 0.5 % by vol. CO

● Fuel pressure

2.8 ... 3.2 bar

B5

● Delivery of electric fuel pump

min. 850 cm³/30s

B7

● Solenoid-operated injection valve

Electrical internal resistance at + 20°C:

15.0 ... 17.5 Ω

B7

● Temperature sensor II (engine)

Double NTC for LE-Jetronic and idle-speed control

Electrical internal resistance of each temperature sensor:

At ambient temperature (+15°C...+30°C): 1.45...3.3 kΩ

With engine at op. temp. (approx. +80°C): 280...360 Ω

See equipment and Autodata microfiches for settings for ignition, valve clearance and other engine data.

B9**A7**

Test specifications

Opel Senator, Monza 3.0 E



● Idle actuator

B5

Electrical internal resistance
of each winding:

11 ... 15 Ω

● Air-flow sensor

B5

Resistance between:

term. 8 and term. 5: 340 ... 450 Ω

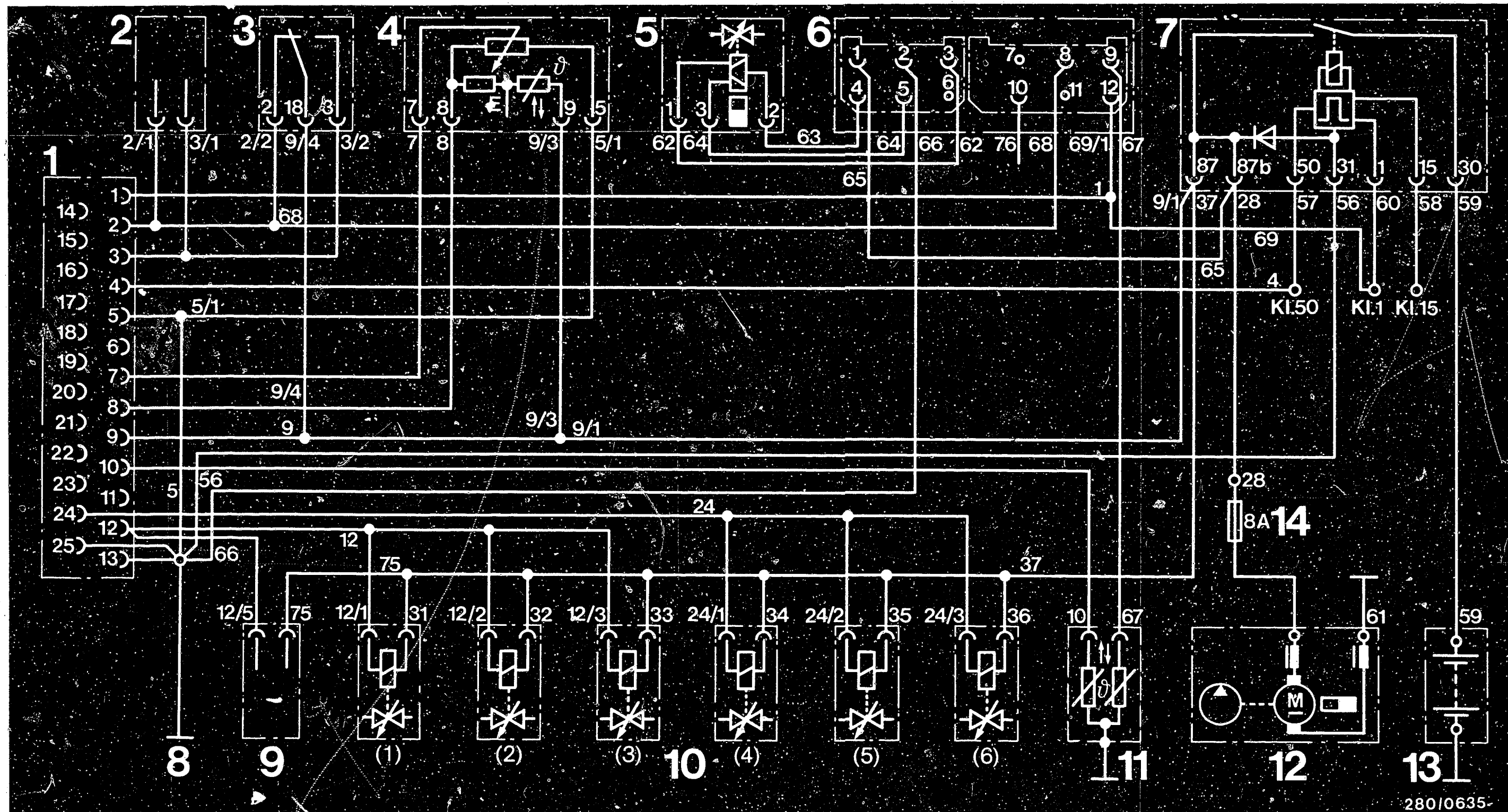
term. 7 and term. 5: 60 ... 1000 Ω

term. 8 and term. 9: 160 ... 300 Ω

term. 9 and term. 5: 500 ... 760 Ω

See equipment and Autodata microfiches for settings for
ignition, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

1 = Multiple plug to control unit
 2 = Ignition trigger box
 3 = Throttle-valve switch
 4 = Air-flow sensor
 5 = Idle actuator

6 = Idle controller (control unit)
 7 = Control relay
 8 = Central ground -out-
 put stages and electronics
 9 = On-board computer

10 = Injection valves
 11 = Double temperature sensor
 (engine temperature NTC II)
 12 = Electric fuel pump
 13 = Battery
 14 = Pump fuse

A9

Electrical terminal diagram
 Opel Senator, Monza 3.0 E

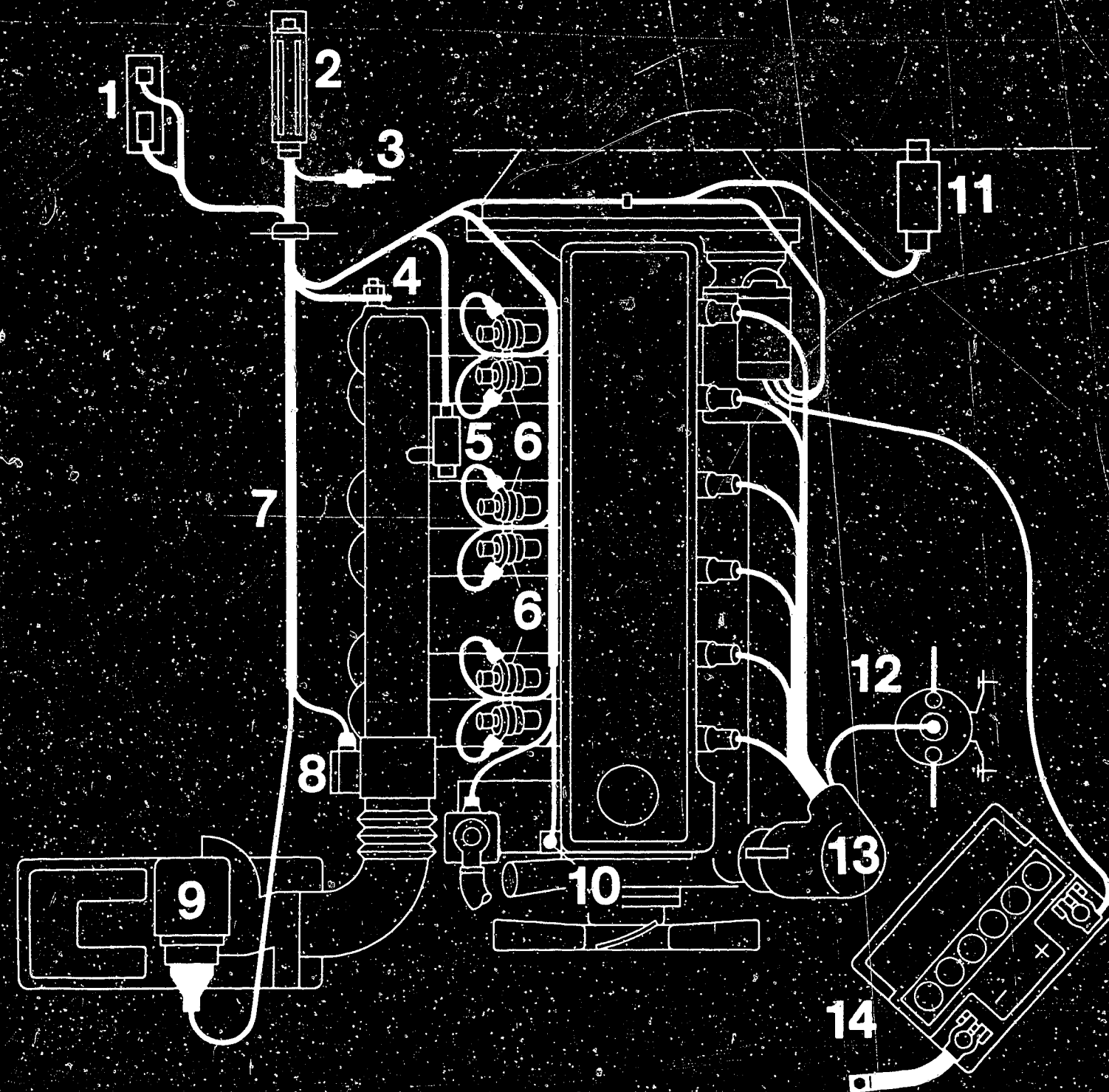


A10

Electrical terminal diagram
 Opel Senator, Monza 3.0 E



280/0635-



280 / 0636

ELECTRICAL WIRING DIAGRAM AND ARRANGEMENT OF INDIVIDUAL COMPONENTS

- | | | | |
|--------------------------------|-----------------------------|--------------------------------|---------------------------|
| 1 = Idle controller | 5 = Idle actuator | 9 = Air-flow sensor | 12 = Ignition coil |
| 2 = Control unit | 6 = Injection valves | 10 = Double temperature sensor | 13 = Ignition distributor |
| 3 = Plug-in connection term. 1 | 7 = Jetronic wiring harness | (engine temperature NTC II) | 14 = Battery |
| 4 = Central ground | 8 = Throttle-valve switch | 11 = Control relay | |

A11

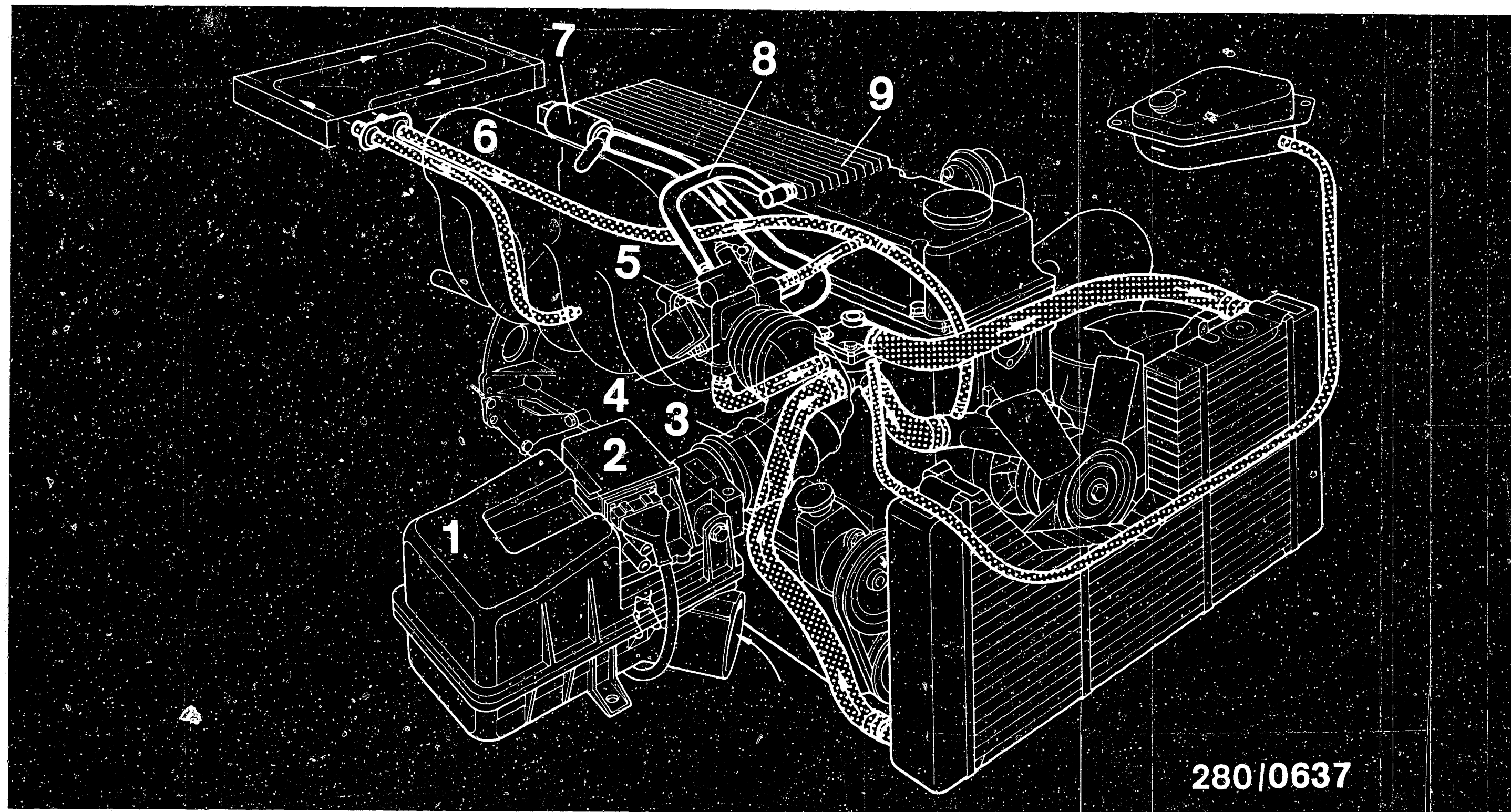
Electrical wiring diagram
Opel Senator, Monza 3.0 E



A12

Electrical wiring diagram
Opel Senator, Monza 3.0 E





280/0637

DIAGRAMS OF AIR AND FUEL LINES

Diagram of air lines

— Air hose lines

... Water hose lines

1 = Air filter

2 = Air-flow sensor

3 = Air-guide hose

4 = Intake manifold heating

5 = Throttle-valve assembly

6 = Intake manifold

7 = Idle actuator

8 = Crankcase breather

9 = Valve cover

A13

Diagrams of air and fuel lines

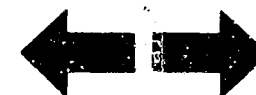
Opel Senator, Monza 3.0 E



A14

Diagrams of air and fuel lines

Opel Senator, Monza 3.0 E



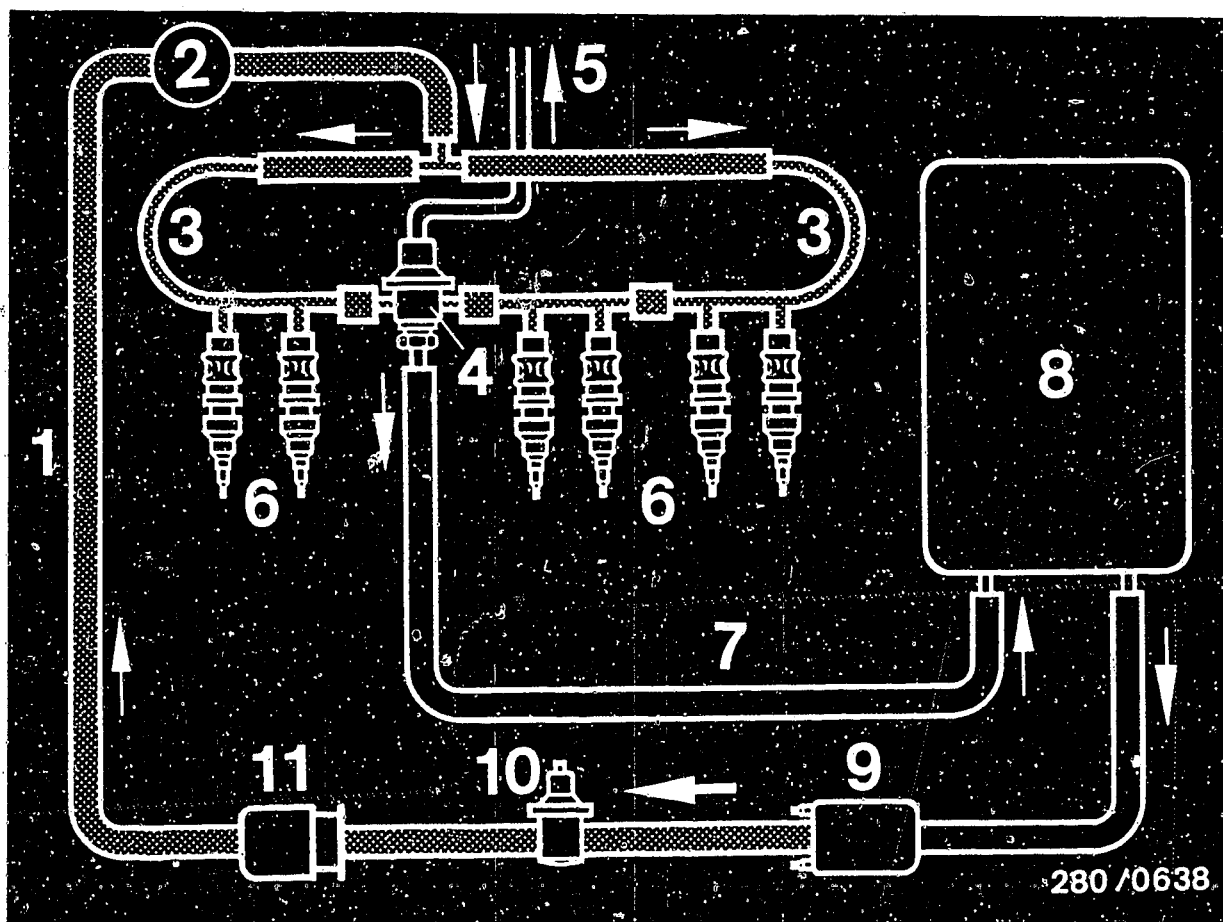


Diagram of fuel lines

— Pressureless

▨ Fuel pressure

- 1 = Delivery line
- 2 = Damper box
- 3 = Fuel ring main
- 4 = Pressure regulator
- 5 = Intake-manifold connection
- 6 = Injection valves

- 7 = Return line
- 8 = Fuel tank
- 9 = Electric fuel pump
- 10 = Pressure damper
- 11 = Fuel filter

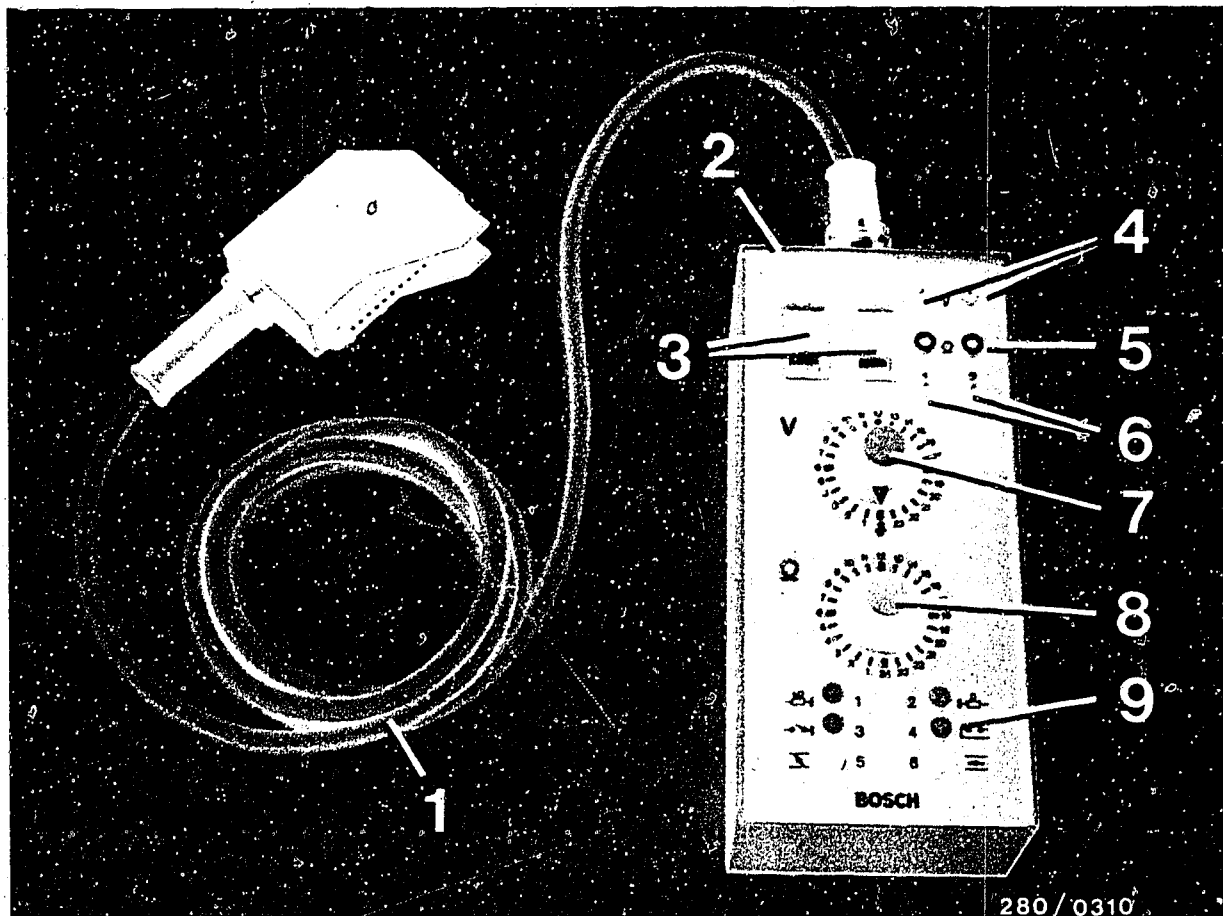


TEST EQUIPMENT AND TOOLS

Description	Designation	Part No.
Universal test adapter	ETT 018.01	0 684 101 801
Adapter lead (LE-Jetronic)		1 684 463 123
Adapter lead (idle-speed control)		1 684 463 137
Motortester	e.g. MOT 002.00 MOT 300 MOT 400	0 684 000 200 0 684 000 300 0 684 000 400
Test lead		1 684 463 093
Exhaust-gas analyzer Calibrated	e.g. ETT 008.00 ETT 008.04 ETT 008.05	0 684 100 800 0 684 100 804 0 684 100 805
Pressure tester e.g. pressure gauge	Quality class 1.0 Measuring range 6 bar 0.1 bar divisions	1 687 231 154 KDJE-P 100
Pressure tester Pressure tester (no longer available) Three-way line		KDEP 1034 KDJE-P 100/13
Electrics tester or multimeter e.g.	ETE 014.00 Philips Miselco Chinaglia	0 684 101 400 PM 2517 X Master 50 K Cortina
Hexagon-socket-screw key	AF 5	
Solenoid-operated injection valve		0 280 150 205

Use suitable commercially available tools for fitting and removing the idle CO anti-tamper device on the air-flow sensor.

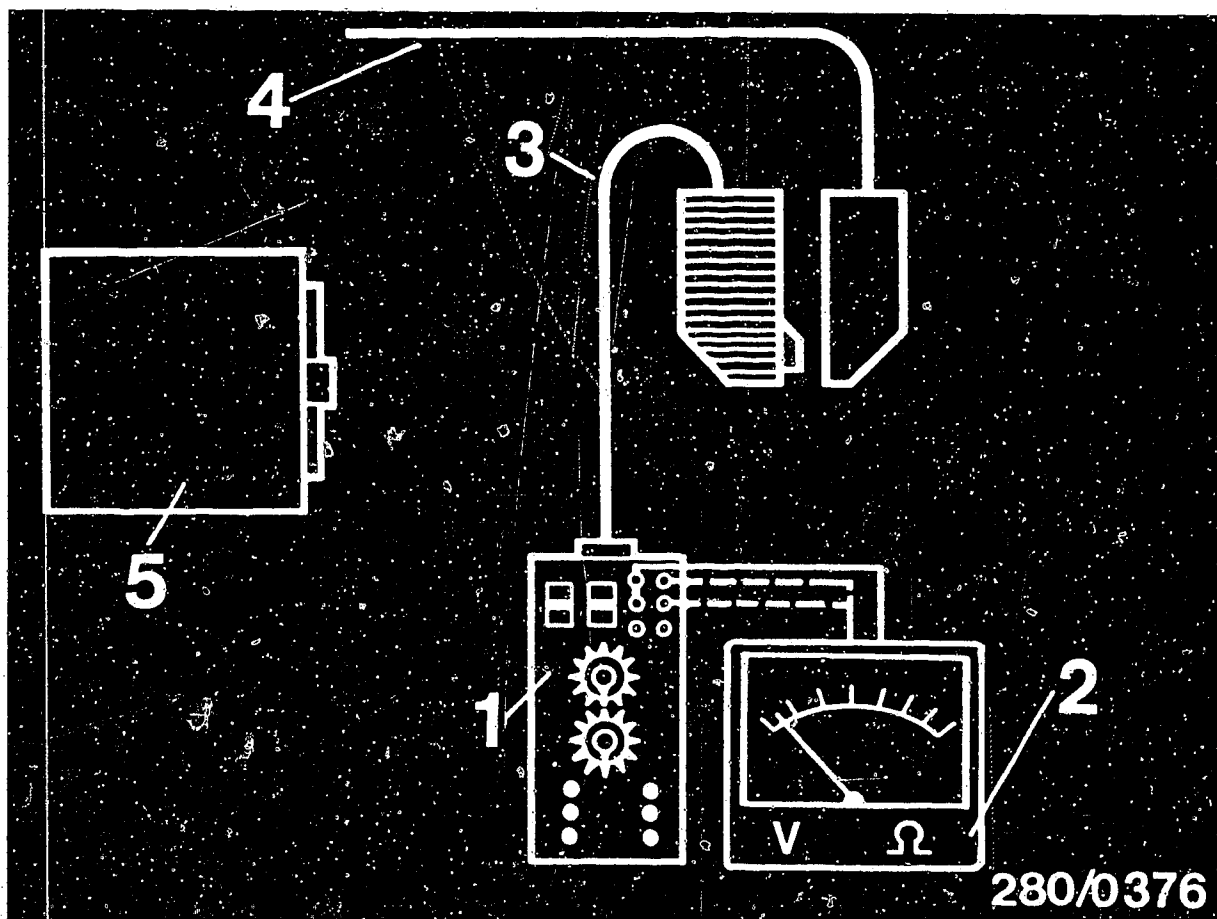




Universal test adapter with adapter lead for LE-Jetronic

- 1 = Adapter lead (part No.: 1 684 463 123)
- 2 = Universal test adapter (part No.: 0 684 101 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not yet occupied)
- 7 = Program switch "V"
- 8 = Program switch "Ω"
- 9 = Button panel (not occupied for LE-Jetronic)





- | | |
|--------------------------------|------------------------------|
| 1 = Universal test adapter | 4 = Jetronic wiring harness |
| 2 = Multimeter | |
| 3 = Adapter lead (LE-Jetronic) | 5 = LE-Jetronic control unit |

Connection:

Remove control-unit plug of Jetronic wiring harness from control unit and connect to plug of adapter lead.

Caution:

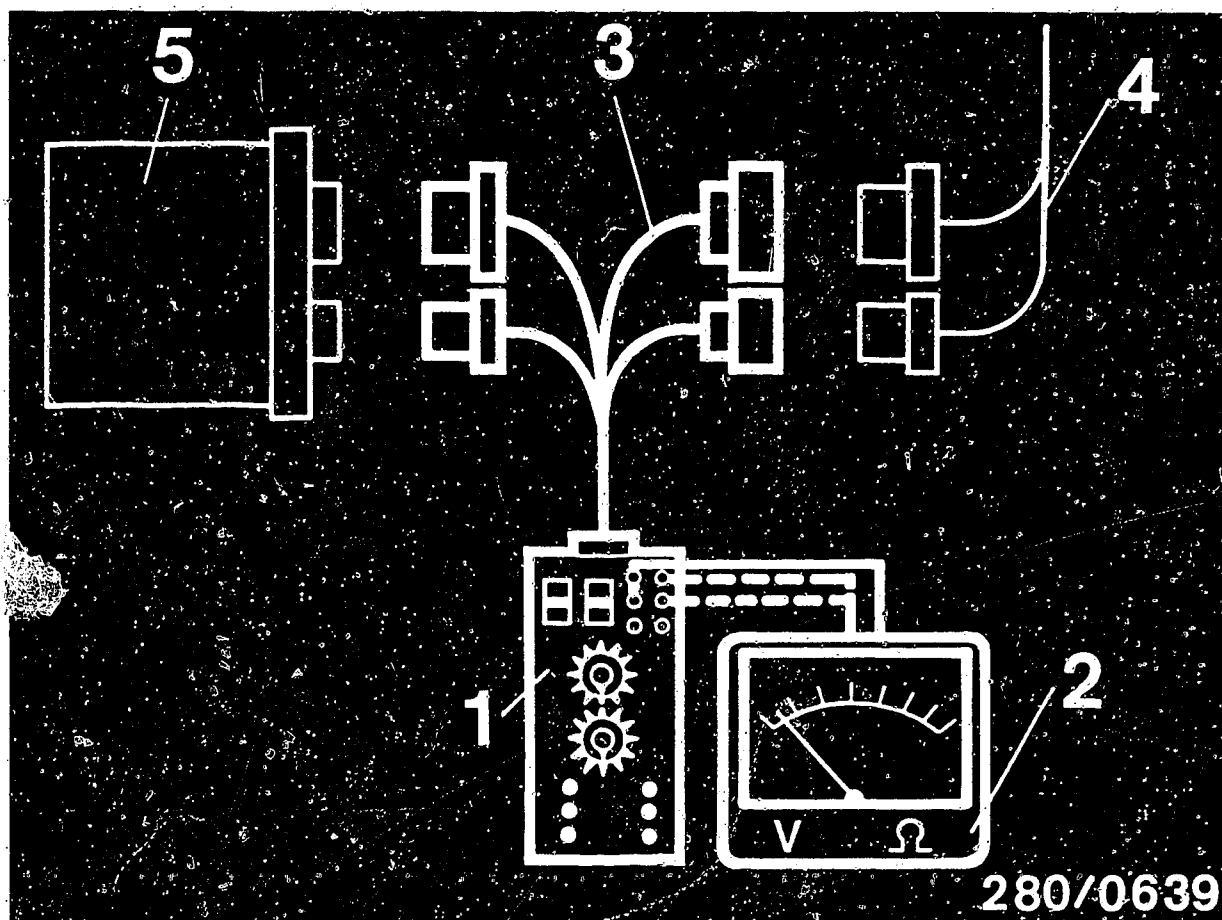
Connect and disconnect the universal test adapter only with the ignition off:

Testing:

For testing, connect a multimeter with R_i min. 20 k Ω /V to the test adapter.

It is also possible for the signal from term. 1 of the ignition coil to be measured with a motortester via the special input.





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- | | |
|----------------------------|-----------------------|
| 1 = Universal test adapter | 4 = Wiring harness of |
| 2 = Multimeter | idle-speed control |
| 3 = Adapter lead | (LFR) |
| 1 684 463 137 | 5 = Idle controller |
| | (LFR control unit) |

Connection:

Connect Y-adapter lead, as shown in diagram, between wiring harness and idle controller.

Caution:

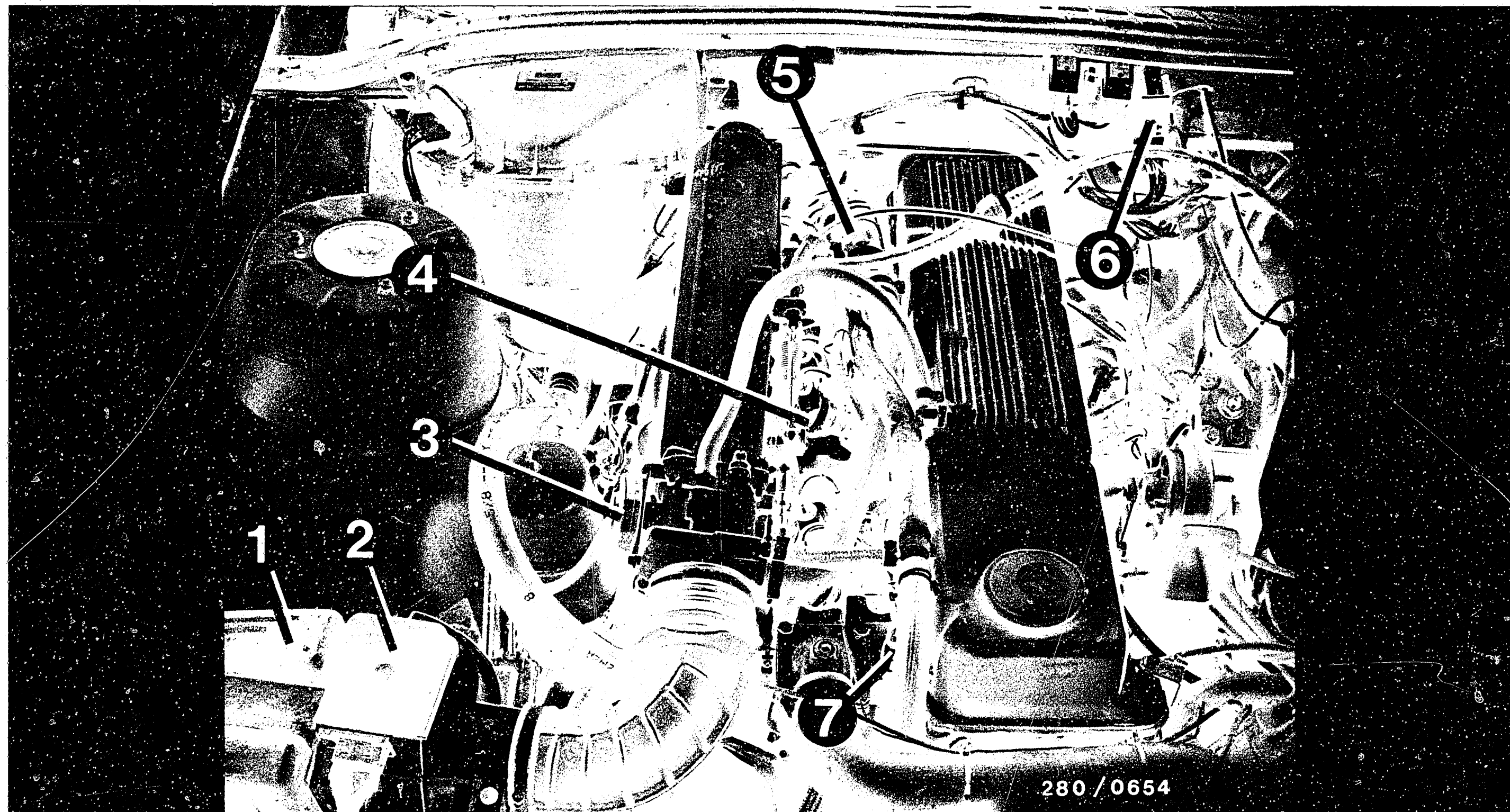
Connect and disconnect the universal test adapter only with the ignition off:

Testing:

For testing, connect a multimeter with R_i min. $20 \text{ k}\Omega/\text{V}$ to the test adapter.

In addition, the signal from term. 1 of the ignition coil can be measured with a motortester via the special input.





INSTALLATION POSITION OF COMPONENTS

● Arrangement of components on engine

1 = Air filter

2 = Air-flow sensor

3 = Throttle-valve switch

4 = Injection valves

5 = Idle actuator

6 = Control relay

7 = Double temperature sensor
(engine temperature NTC II)

A20

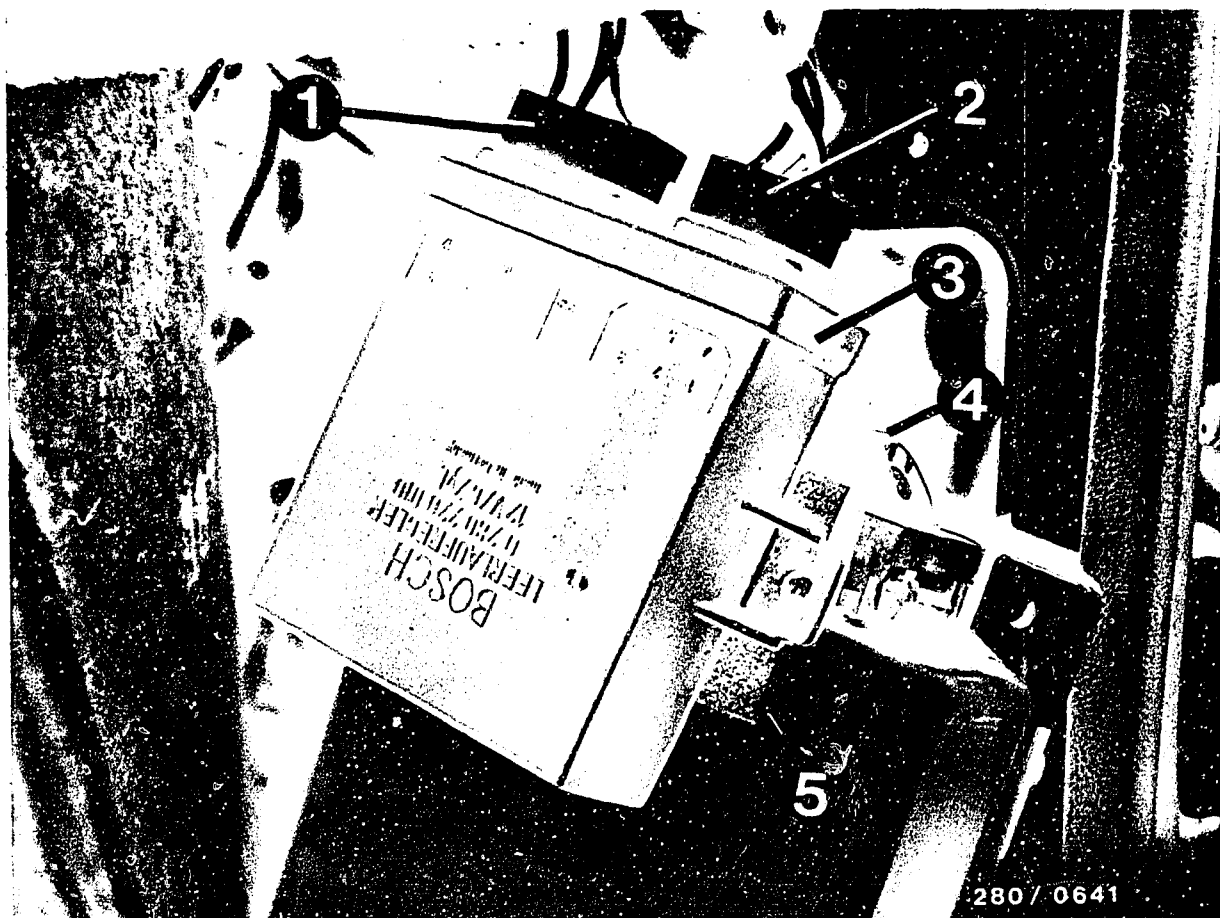
Installation position of components
Opel Senator, Monza 3.0 E



A21

Installation position of components
Opel Senator, Monza 3.0 E





Idle-speed control

- 1 = 8-pin plug
- 2 = 6-pin plug
- 3 = Idle controller
(control unit)

LE-Jetronic

- 4 = 25-pin control-unit
plug
- 5 = Control unit

● Control units in passenger compartment

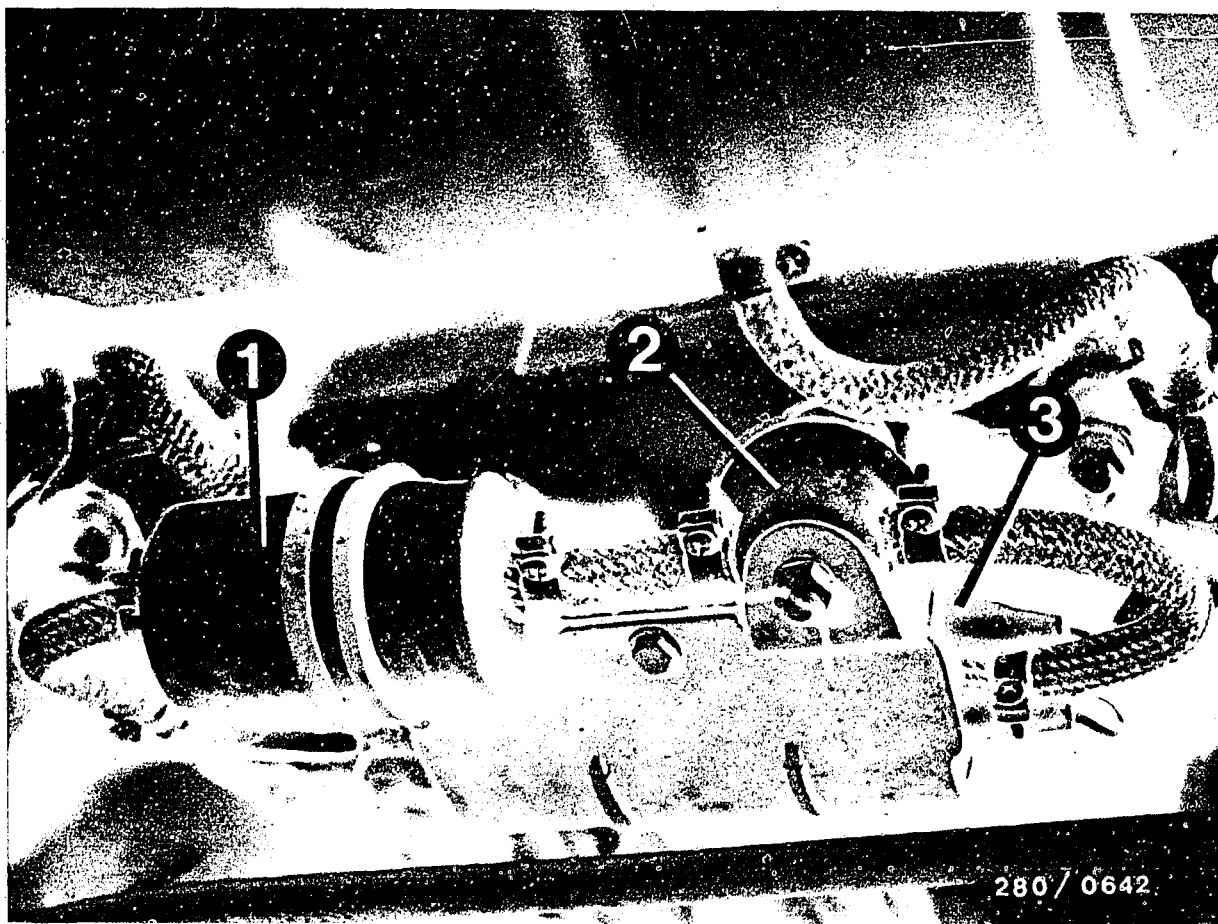
All indications "right" and "left" refer to the forward direction of travel.

Both control units are situated one on top of the other in the front-passenger footwell at the bottom right.

LE-Jetronic - Connect universal test adapter with 25-pin adapter lead to control-unit plug.

Idle-speed control - Connect universal test adapter with 6/8-pin adapter lead between both plugs and idle controller (control unit).





- 1 = Fuel filter
- 2 = Pressure damper
- 3 = Electric fuel pump;
protected against dirt by holding plate
(partially obscured in the picture).

● Fuel-supply components

All three components are mounted on the underside of the vehicle to the right of the fuel tank.



Important general information

1. Never start engine without securely connected battery.
2. Never use a starting aid with more than 16 V or a fast charger for starting.
3. Never disconnect battery from vehicle electrical system with engine running.
4. When fast charging, disconnect battery from vehicle electrical system.
5. Remove control unit at temperatures above 80°C (paint-drying installation).
6. Ensure that all connectors of wiring harness are secure.
7. Never connect or disconnect control-unit plug with the ignition on.
8. When testing compression, cut the power supply by disconnecting the control relay. This ensures that the power supply is cut to the LE-Jetronic and therefore also to the injection valves. Undesired injecting is thus prevented.
9. The LE-Jetronic control unit must be removed before performing electrical welding work (e.g. spot welding).
10. When using the following trouble-shooting program it is assumed that the engine is in proper working order and that the ignition is correctly set. The electrical system must be checked and, if necessary, repaired.

In order to be able to perform the test operations described in this manual and to assess the components, you should be familiar with the L-Jetronic and how it works. The essential points regarding the construction and operation of the L-Jetronic are described in Technical Instruction VDT-U3/3.

The LE version of the L-Jetronic is described in Technical Bulletin, New Product, VDT-I-280/6.



TROUBLE-SHOOTING CHARTS

The following trouble-shooting charts are designed to enable workshop employees, using the universal test adapter with adapter lead (1 684 463 123) and other suitable test equipment, to quickly locate causes of trouble on the LE-Jetronic. Depending on the level of knowledge and experience of the mechanic, a choice can be made between the following procedures:

- Detailed, step-by-step trouble-shooting chart

For employees with little practice or experience on vehicles equipped with LE-Jetronic.
There is a complete trouble-shooting program for each customer complaint.

B3

- Direct, pin-pointed trouble-shooting chart

For trained, experienced employees who have had a great deal of practice on vehicles equipped with LE-Jetronic.
The trouble-shooting for each customer complaint starts with a specific component within the trouble-shooting program.

B5

Both trouble-shooting charts begin by checking the electrical/electronic part of the LE-Jetronic with the aid of the universal test adapter with adapter lead. In this way, the wiring harness with the connected components is soon checked for proper electrical operation and faults are quickly located.

If no fault is found using the universal test adapter, it is necessary to test the fuel pressure.

If no fault is found, continue trouble-shooting with the detailed or the direct trouble-shooting chart.

B1

Trouble-shooting chart

Opel Senator, Monza 3.0 E

**B2**

Trouble-shooting chart

Opel Senator, Monza 3.0 E



1. Detailed, step-by-step trouble-shooting chart for the complete trouble-shooting program

- Test with universal test adapter with adapter lead 1 684 463 123 and motortester or multimeter

This test must come at the beginning of the test program and must be performed from beginning to end (Coordinates B 9...D 3).

- Fuel-pressure test with pressure gauge

This test must come immediately after the test with the universal test adapter and must be performed from beginning to end (Coordinates C 8...D 13).

- Trouble-shooting according to customer complaints (symptoms of trouble)

The table below contains possible symptoms of trouble and gives the first coordinate of the relevant detailed trouble-shooting program in the column of the right.

The trouble-shooting program consists of logically ordered test procedures for all individual components of the LE-Jetronic. If, after completing the trouble-shooting program for an assumed trouble, the fault has not been detected or remedied, take a new symptom of the trouble and work through another program.

<u>Customer complaints</u> (fault symptoms)	Electrical test with universal test adapter		Fuel pressure test with pressure gauge	Trouble-shooting program
	LE-Jetronic	Idle-speed control		
1. Starting motor operates, engine fails to start or starts only with great difficulty	B 9	C 11	D 4	D 14
2. Engine starts but then dies	B 9	C 11	D 4	E 7
3. Uneven idle/incorrect idle speed	B 9	C 11	D 4	E 15
4. Poor throttle take-up	B 9	C 11	D 4	F 13
5. Engine missing under all operating conditions	B 9	C 11	D 4	G 7
6. Fuel consumption too high	B 9	C 11	D 4	H 7
7. Maximum engine power/top speed not reached	B 9	C 11	D 4	H 19
8. Idle speed and CO concentration too low or too high	B 9	C 11	D 4	J 9

B3

Trouble-shooting chart

Opel Senator, Monza 3.0 E

**B4**

Trouble-shooting chart

Opel Senator, Monza 3.0 E



2. Pin-pointed direct trouble-shooting

- Electrical test with universal test adapter with adapter lead 1 684 463 123 and motortester or multimeter

The test with the universal test adapter must come at the beginning of the test program and must be performed from beginning to end (Coordinates B 9...D 3).

- Fuel pressure test with pressure gauge

The fuel pressure test must come immediately after the test with the universal test adapter and must be performed from beginning to end (Coordinates C 8...D 13).

- Trouble-shooting according to customer complaints

The table below contains various symptoms of trouble with several possible causes of the trouble in each case. The coordinate reference field indicates the first coordinate of the test procedure for the respective LE-Jetronic component. If, after testing the individual components, the fault has not been detected or remedied, choose a new symptom of the trouble.

Customer complaints (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with great difficulty								
2. Engine starts but then dies								
3. Uneven idle/incorrect idle speed								
4. Poor throttle take-up								
5. Engine missing under all operating conditions								
6. Fuel consumption too high								
7. Maximum engine power/top speed not reached								
8. Idle speed and CO concentration too low or too high								
Cause (component fault)								
B9	B9	B9	B9	B9	B9	B9	B9	Fault in electrical test with universal test adapter , LE-Jetronic, idle-speed control
D4	D4	D4	D4	D4	D4	D4	D4	Fault in fuel supply. Pressure regulator defective. Control relay defective. Electric fuel pump not operating. Fuel pressure test.
D22	E9		F17					Auxiliary-air device not opening
		E21					J13	Auxiliary-air device not closing
E1		F5	F19	G9	H13	J3	J15	Air-flow sensor defective, potentiometer test (noise test)
E3	E11							Hot-starting difficulties - air intake system or fuel system leaking

B5

Trouble-shooting chart

Opel Senator, Monza 3.0 E

**B6**

Trouble-shooting chart

Opel Senator, Monza 3.0 E



Customer complaints (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven idle/incorrect idle speed

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. Maximum engine power/top speed not reached

8. Idle speed and CO concentration too low or too high

Cause (component fault)

D16								Cold-start control defective
E3	E11	F7	G1			J5	J17	Air-intake system leaking
		E23		G23	H9			Injection valves defective; connect test lead
				G15		J1		Delivery of electric fuel pump too low
		E17	F15	G17				Throttle valve not closing (test overrun cutoff)
						H21		Throttle valves not opening fully
		E17	F15	G17				Throttle-valve switch defective (adjustment)
		E19	G3		H15		J11	CO exhaust-gas setting too rich, idle adjustment
		E19	G3	G21			J11	CO exhaust-gas setting too lean, idle adjustment, burbling
				G17				Control unit defective

B7

Trouble-shooting chart

Opel Senator, Monza 3.0 E



B8

Trouble-shooting chart

Opel Senator, Monza 3.0 E



TEST CHART FOR UNIVERSAL TEST ADAPTER

TESTING OF LE-JETRONIC

with adapter lead 1 684 463 123

- Before testing with the universal test adapter, check all multiple plug connectors for loose contacts.
Clean contacts if dirty or corroded.
- Watch for blade receptacles which have been pushed back.
If necessary, bend back the latching lug and press the blade receptacle as far as it will go into the plug housing; latching lug locks into position.
- Suspicion of line breaks in case of kinking and pinching.

The universal test adapter tests only the peripherals of the electrics (without control unit).

Remove control-unit plug of Jetronic wiring harness from control unit and connect to plug of adapter lead (ignition must be off).

To make measurements, connect a multimeter to the universal test adapter for measuring voltage and resistance, as well as a motortester.

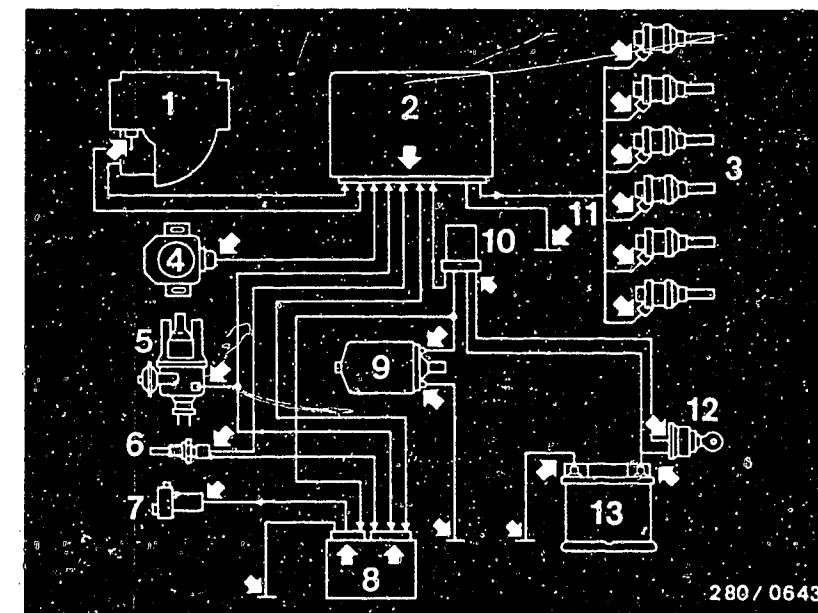
The individual test steps are selected by means of two program switches (one for voltage measurements and the other for resistance measurements). Each program switch has 24 test positions. However, only some of these are occupied for the LE-Jetronic.

If a fault is found during a test, the test must be repeated after remedying the fault.

The test with the universal test adapter must always be performed from beginning to end. Be sure to follow the instructions in the test chart.

- Test steps 1...3 measure voltages during starting.
Set multimeter to "voltage measuring range".
- Test steps 4...12 measure resistances.
Set multimeter to "resistance measuring range".

Test specifications and notes on how to operate the universal test adapter are given in the following test chart.



Electrical plug-in connections
(arrows)

- 1 = Air-flow sensor
- 2 = Control unit
- 3 = Injection valves
- 4 = Throttle-valve switch
- 5 = Ignition distributor
- 6 = Double temperature sensor
(engine temperature NTC II)
- 7 = Idle actuator
- 8 = Idle controller
- 9 = Electric fuel pump
- 10 = Control relay
- 11 = Central ground
- 12 = Ignition lock
- 13 = Battery

B9

Test chart for universal test adapter
Opel Senator, Monza 3.0



B10

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



Note:

In the following test steps a white surround in the "Operation" column indicates which operation is different from the preceding test step.

TEST STEP: 1

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
Program switch "V" at position:	5	Measuring equipment must indicate <u>ignition pulses</u>	<u>Component:</u> Ignition system signal from term. 1
Program switch "Ω" at position:	—*		
Measuring equipment: ignition oscilloscope		<div>Yes</div> <div>No</div>	<u>Operation:</u> Voltage pulses energization of control unit by the ignition
Measuring range: Special input . Control stick up against left-hand stop and measuring range 20V			
Connection: Testwells			<u>Malfunction:</u> No reading
Operation in vehicle: Ignition "ON" and operate starting motor			
		Continue testing with <u>next test step</u> .	

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

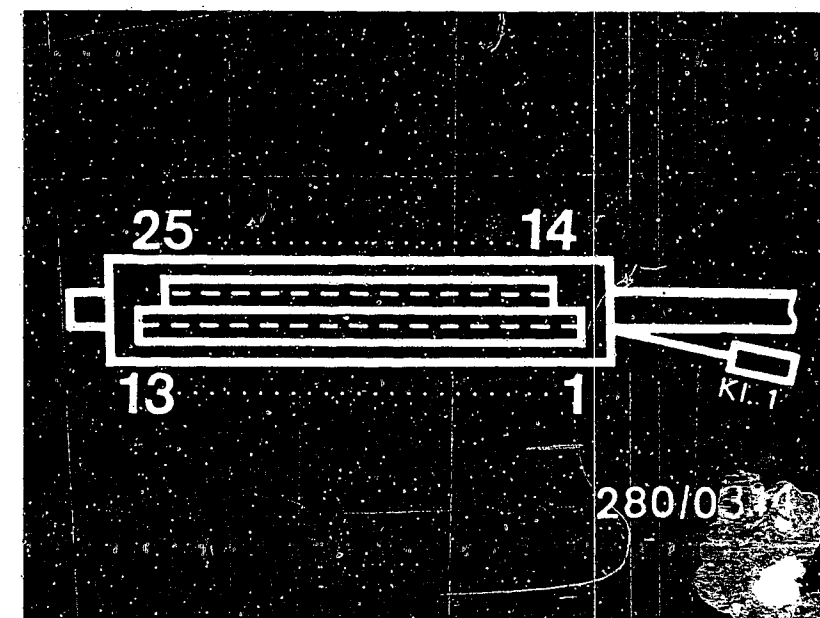
Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 1 to ignition coil term. 1.
- From control-unit plug term. 5 to central ground.
- Eliminate contact resistances in the plug-in connections.

If ignition pulse still not visible - test ignition system.

Installation position of components

- Control unit: in passenger compartment, front passenger side in footwell at bottom right.
- Central ground on intake port of cylinder 6, at rear. * Switch position not specified.



Top view of control-unit plug

B11

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

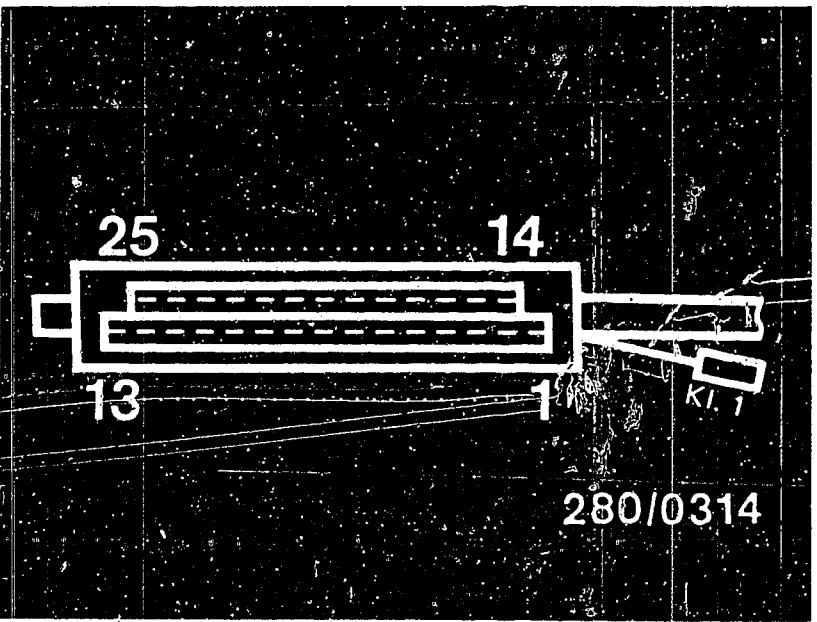


B12

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP: 2			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> at position:	6	Measuring equipment must indicate <u>8 ... 15 V.</u>	<u>Component:</u> Control relay, voltage supply
<u>Program switch "Ω"</u> at position:	—		
<u>Measuring equipment:</u> motor- tester or multimeter (V range)		<div><div>Yes</div><div>No</div></div>	<u>Operation:</u> Voltage supply from term. 87
<u>Measuring range:</u> 0...15 V			
<u>Connection:</u> test socket red (+) test socket black (-)			
<u>Operation in vehicle:</u> Ignition "ON" and operate starting motor			<u>Malfunction:</u> No voltage reading
			Continue testing with <u>next test</u> <u>step.</u>



Top view of control-unit plug

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

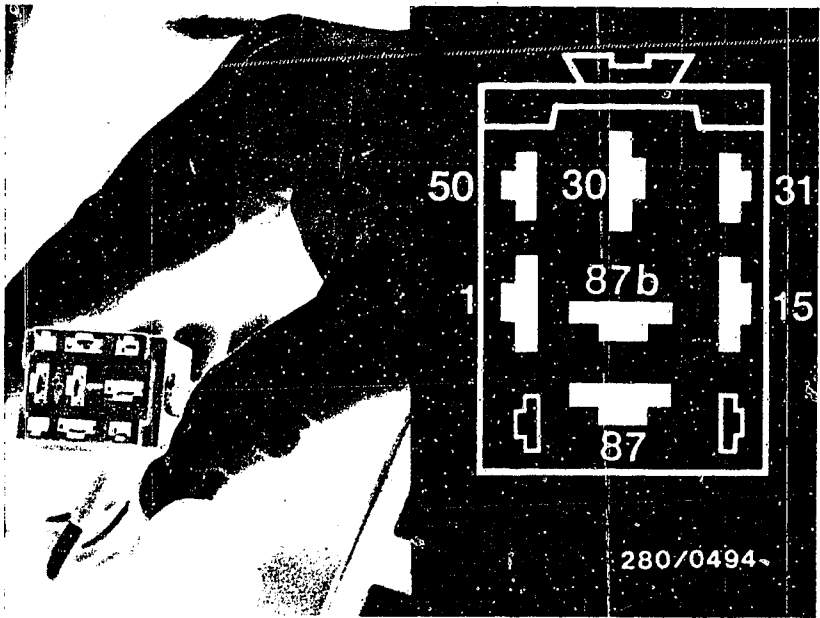
Using ohmmeter, test the following leads for continuity (set value approx. 0 Ω):

- From control-unit plug term. 9 to control relay term. 87.
- Disconnect battery for further testing.

- From control relay term. 30 to battery (positive terminal).
 - From control relay term. 15 to ignition term. 15.
 - From control relay term. 50 to starting motor term. 50.
 - From control relay term. 31 to central ground.
 - Eliminate contact resistances at the plug-in connections.
- If still no voltage reading - replace control relay.

Installation position of components:

- Control unit: in passenger compartment, front passenger side in footwell at bottom right.
- Control relay: In engine compartment, center of firewall.



TEST STEP: 3		
Operation		Reading
Program switch "V" at position:	7	Measuring equipment must indicate 8 ... 15 V.
Program switch "Ω" at position:	-	
Measuring equipment: motor-tester or multimeter (V range)		<div> <div>Yes</div> <div>No</div> </div>
Measuring range: 0...15 V		
Connection: test socket red (+) test socket black (-)		
Operation in vehicle: Ignition "ON" and operate starting motor		
		Continue testing with next test step.
Testing		
Component:		Control relay, starting motor
Operation:		Starting signal from term. 50
Malfunction:		No voltage reading

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

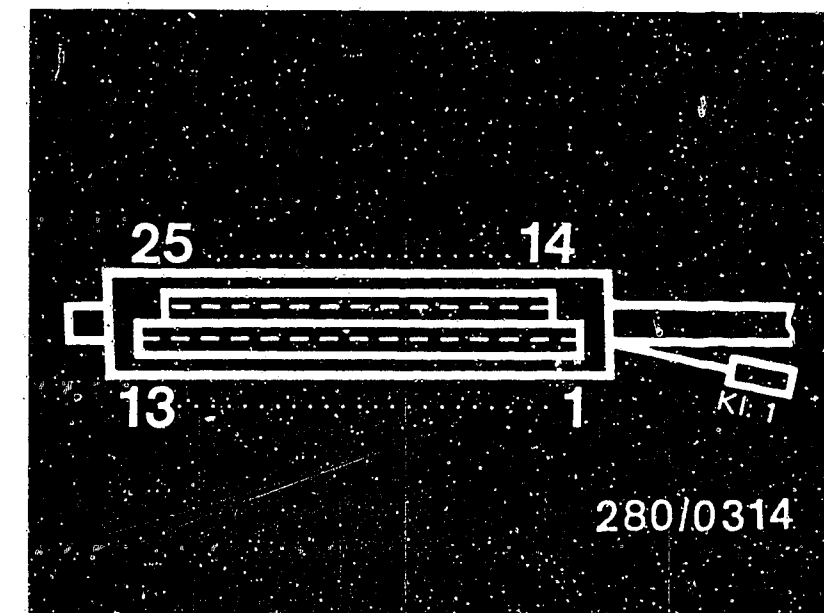
Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 4 to control relay term. 50.
- Eliminate contact resistances at the plug-in connections.

If still no voltage reading - test starting control.

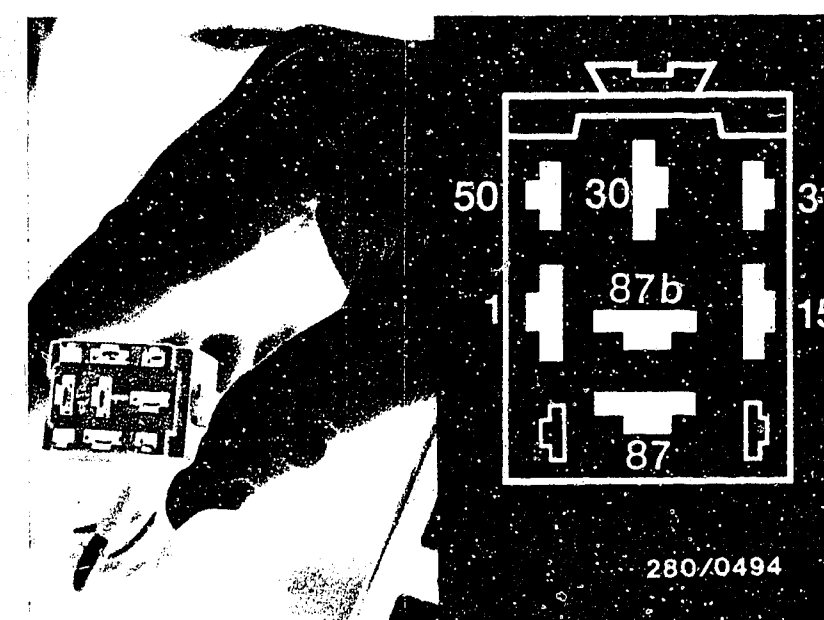
Installation position of components:

- Control unit: in passenger compartment, front passenger side in footwell at bottom right.
- Control relay: in engine compartment, center of firewall.



Top view of control-unit plug

Control relay disconnected
Top view of plug



B 15


Test chart for universal test adapter
Opel Senator, Monza 3.0 E



B 16

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP: 4		
Operation	Reading	Testing
Program switch "V" at position: 	Measuring equipment indicate <u>100 ... 200 Ω</u>	Component: Air-flow sensor (temperature sensor I)
Program switch "Ω" at position: 11		
Measuring equipment: motor-tester or multimeter	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Yes ↓ Continue testing with next test step. </div> <div style="text-align: center;"> No ↓ </div> </div>	Operation: Resistance between air-flow sensor term. 8 to central ground
Measuring range: x 10 Ω		Malfunction: Resistance outside tolerance
Connection: Test sockets blue		
Operation in vehicle: ---		

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

1. Electric fuel pump:

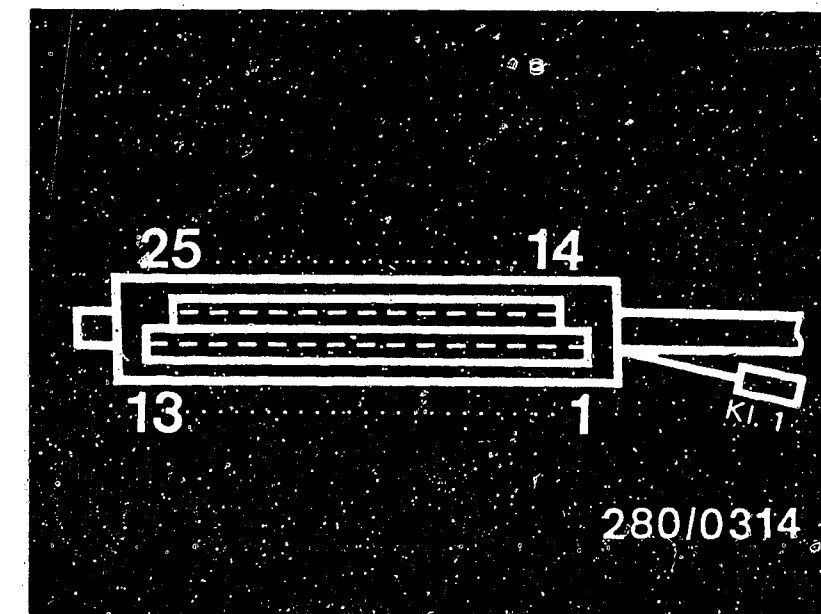
- From control relay term. 87b through pump fuse to electric fuel pump (positive terminal).
- From electric fuel pump (negative terminal) to ground terminal on body

2. Air-flow sensor

- From multiple plug term. 8 to air-flow sensor term. 8.
- From air-flow sensor term. 5 to central ground.
- From air-flow sensor term. 9 to control-unit plug term. 9.

Eliminate contact resistances in plug-in connections.

If resistance reading still outside tolerance - replace air-flow sensor.



Top view of control-unit plug

Installation position of components

- Electric fuel pump:
Under vehicle, right of fuel tank.
- Control unit:
In passenger compartment, in front passenger footwell at bottom right.
- Air-flow sensor:
In engine compartment in front of right-hand spring strut.
- Central ground:
On intake port of cylinder 6, at rear.
- Pump fuse:
In central fuse box on left under steering wheel.

B 17

Test chart for universal test adapter

Opel Senator, Monza 3.0 E



B 18

Test chart for universal test adapter

Opel Senator, Monza 3.0 E



TEST STEP: 5			
Operation		Reading	Testing
Program switch "V" at position:	↓	Measuring equipment indicate 60 ... 1000 Ω	Component: Air-flow sensor (potentiometer)
Program switch "Ω" at position:	12		
Measuring equipment: motor- tester or multimeter		<div><div>Yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div><div>No</div><div>↓</div><div></div></div>	Operation: Resistance between air-flow sensor term. 7 to central ground
Measuring range: x 10 Ω			
Connection: Test sockets blue			
Operation in vehicle: Deflect air-flow sensor flap			

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

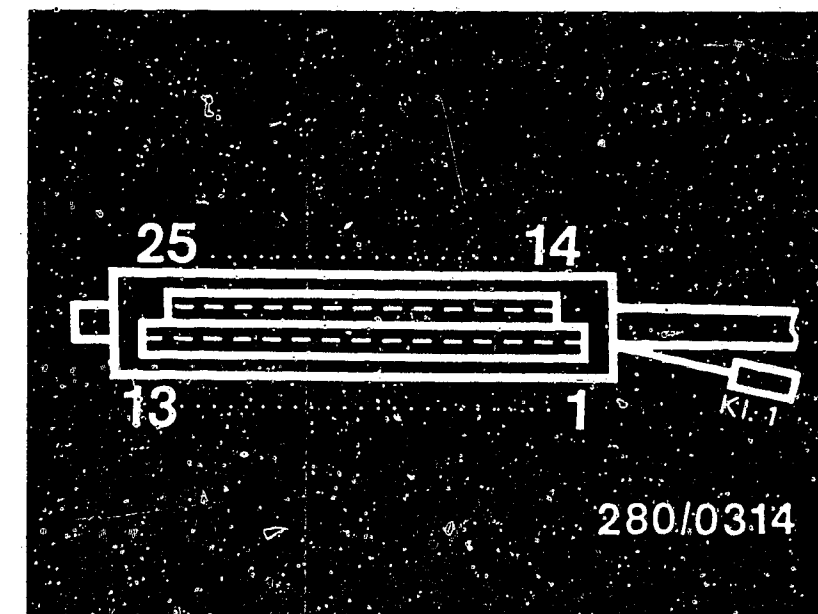
Using ohmmeter, test the following leads for continuity
(set value 0 Ω)

- From control-unit plug term. 7 to air-flow sensor term. 7
- Eliminate contact resistances in the plug-in connections.

If resistance reading still outside tolerance - replace air-flow sensor.


Installation position of components

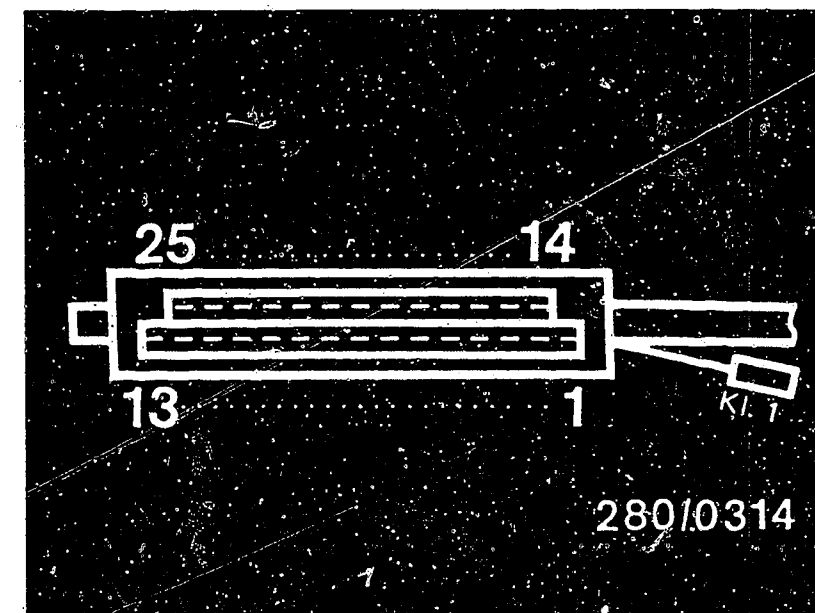
- Control unit: In passenger compartment, in front passenger footwell at bottom right.
- Air-flow sensor: in engine compartment in front of right-hand spring strut.



Top view of control-unit plug

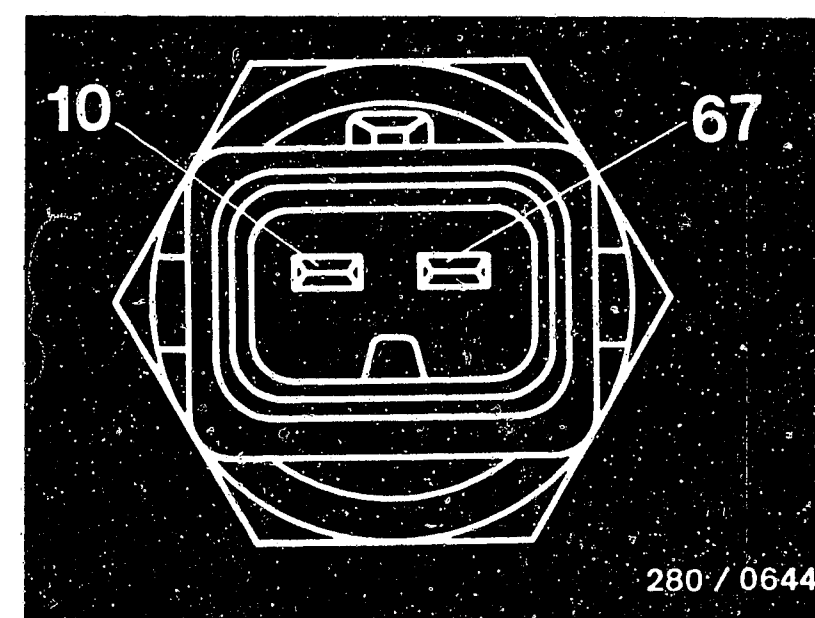


TEST STEP: 6			
Operation		Reading	Testing
Program switch "V" at position:		At ambient temperature (+15°C ... +30°C) measuring equipment must indicate: <u>1.45...3.3 kΩ</u> with engine at normal op. temp. (approx. +80 °C) <u>280...360 Ω</u>	<u>Component:</u> Double temperature sensor (engine temperature NTC II)
Program switch "Ω" at position:	13		<u>Operation:</u> Resistance between air- flow sensor term. 10 to central ground. Vehicle ground and tem- perature-sensor ground.
Measuring equipment: motor- tester or multimeter			<div>Yes</div> <div>Continue testing with next test step.</div>
Measuring range: x 10 Ω or x 100 Ω			
Connection: Test sockets blue			<u>Malfunction:</u> Resistance outside tolerance
Operation in vehicle: ---			



Top view of control-unit plug

Top view of connector of
double temperature sensor



Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Measure resistance directly at double temperature sensor term. 10 (NTC II, white plug) to ground on housing.

If the measured resistance is outside tolerance - replace temperature sensor.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 10 to temperature sensor II (engine term. 10.
- Ground contact of temperature-sensor housing to engine and to central ground.
- Eliminate contact resistances in the plug-in connections.

Installation position of components

- Temperature sensor II (engine): On engine block at front right (white plug)
- Central ground: On intake port of cylinder 6, at rear.
- Control unit: In front passenger footwell, bottom right

B21

Test chart for universal test adapter

Opel Senator, Monza 3.0 E




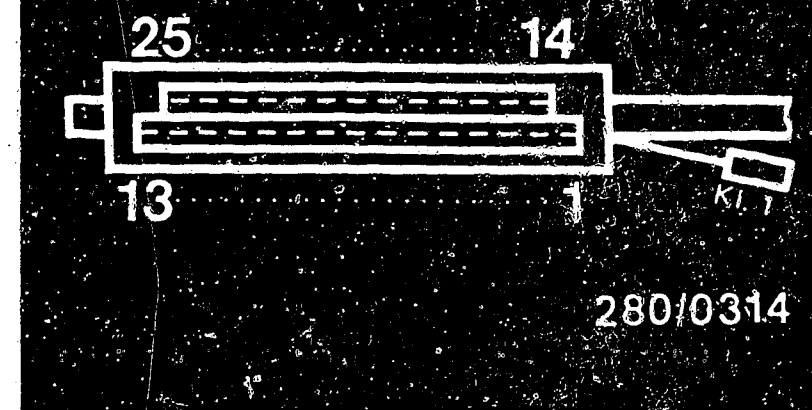
B22

Test chart for universal test adapter

Opel Senator, Monza 3.0 E



TEST STEP: 7			
Operation		Reading	Testing
<u>Program switch "V"</u> at position:		Measuring equipment indicate <u>0 ... 10 Ω</u>	<u>Component:</u> Ground connection of out- put stage
<u>Program switch "Ω"</u> at position:	14		
<u>Measuring equipment:</u> motor- tester or multimeter		<div><div>Yes</div><div>No</div></div> <div>Continue testing with <u>next test</u> <u>step.</u></div>	<u>Operation:</u> Ground connection of control unit term. 13
<u>Measuring range:</u> x 1 Ω			
<u>Connection:</u> Test sockets blue			<u>Malfunction:</u> Resistance outside tolerance
<u>Operation in vehicle:</u> ---			



Top view of control-unit plug

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 13 to central ground.

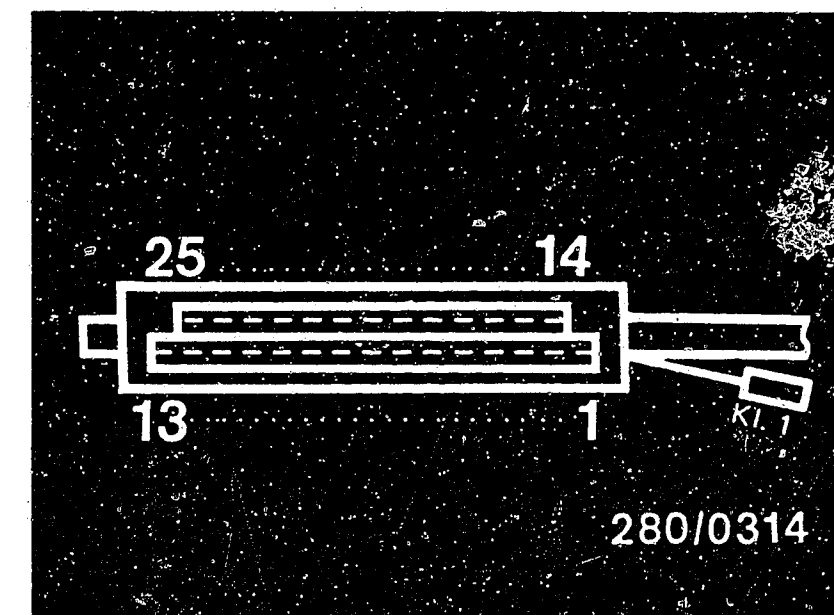
Eliminate contact resistances in the plug-in connections.

Installation position of components

- Control unit: in front passenger footwell bottom right
- Central ground: On intake port of cylinder 6, at rear.



TEST STEP 8				
Operation		Reading	Testing	
Program switch "V" at position:	↓	Measuring equipment must indicate <u>0 ... 10 Ω.</u>	Component: Ground connection of output stage	
Program switch "Ω" at position:	15			
Measuring equipment: Motor-tester or multimeter		<div>yes</div> <div>↓</div> <div>Continue testing with next test step.</div>	<div>Operation:</div> <div>Ground connection of control unit term. 25</div> <div>Malfunction:</div> <div>Resistance outside tolerance</div>	
Measuring range: x 1 Ω				
Connection: Test sockets blue				
Operation in vehicle: -----				
		no		



Top view of control-unit plug

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Test the following lead for continuity with ohmmeter (set value approx. 0 Ω):

- From control-unit plug term. 25 to central ground
- Eliminate contact resistances at the plug-in connections.

Installation position of components:

- Control unit: In front passenger footwell, at bottom right.
- Central ground: On intake port of cylinder 6, at rear.

C1

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

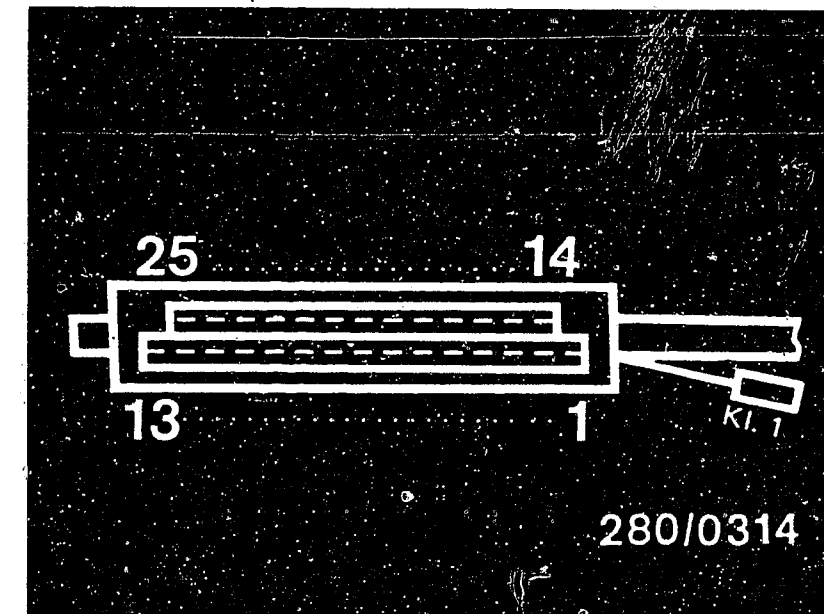


C2

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

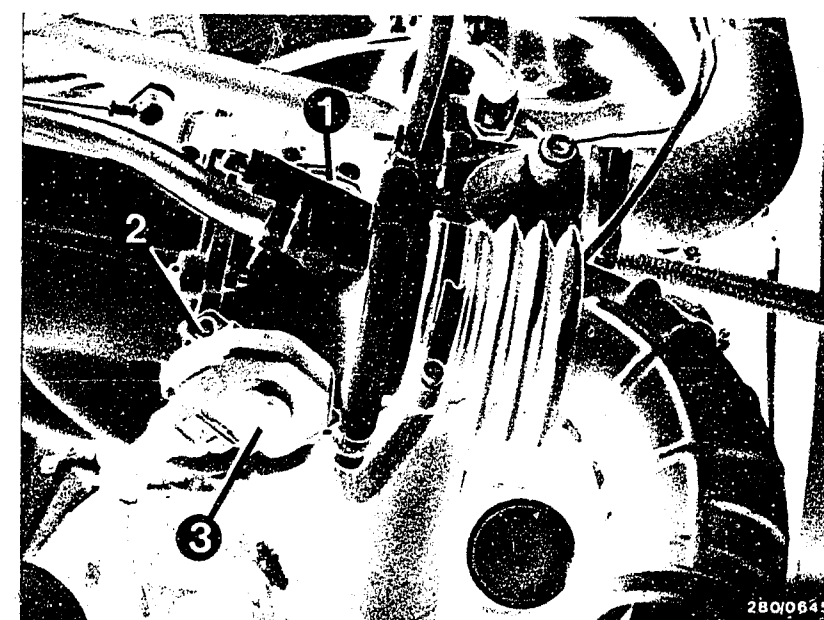


TEST STEP: 9			
Operation		Reading	Testing
Program switch "V" at position:	↓	Measuring equipment indicate 0 ... 10 Ω	Component: Throttle-valve switch (idle contact)
Program switch "Q" at position:	16		
Measuring equipment: motor-tester or multimeter		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Yes</p> ↓ </div> <div style="text-align: center;"> <p>No</p> ↓ </div> </div>	Operation: Resistance between throttle-valve switch term. 2 and term. 18 (lead 9) Malfunction: Resistance outside tolerance
Measuring range: x 1 Ω			
Connection: Test sockets blue			
Operation in vehicle: Accelerator in rest position			
		Continue testing with next test step.	



Top view of control-unit plug

- 1 = Throttle lever
- 2 = Fastening screws
- 3 = Throttle-valve switch



Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Adjusting the throttle-valve switch (on intake manifold on right):

Slightly loosen fastening screws of throttle-valve switch. Connect ohmmeter to throttle-valve switch between term. 2 and lead 9 (term. 18). Turn throttle-valve switch in a counterclockwise direction until the idle contact closes (microswitch can be heard to click). Reading 0 Ω . If not, replace throttle-valve switch.

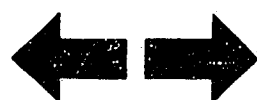
Checking the adjustment: Pull slightly on throttle cable. The idle contact opens (microswitch can be heard to click). Reading $\infty \Omega$.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 2 to throttle-valve switch term. 2.
- From throttle-valve switch lead 9 (term. 18) to control-unit plug term. 9.
- Eliminate contact resistances in the plug-in connections.

C3

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

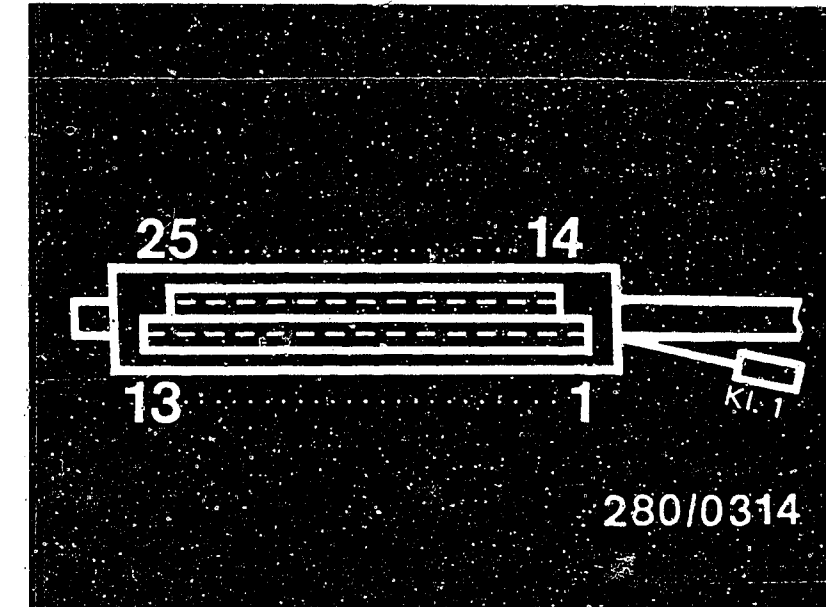


C4

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP: 10		
Operation	Reading	Testing
Program switch "V" at position:	↓ Measuring equipment indicate 0 ... 10 Ω	Component: Throttle-valve switch (Full-load contact)
Program switch "Ω" at position:	17	
Measuring equipment: motor-tester or multimeter	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Yes ↓ Continue testing with next test step. </div> <div style="text-align: center;"> No ↓ </div> </div>	Operation: Resistance between throttle-valve switch term. 3 and term. 18 (lead 9)
Measuring range: $\times 1 \Omega$		
Connection: Test sockets blue		
Operation in vehicle: Accelerator in full-load position		Malfunction: Resistance outside tolerance



Top view of control-unit plug

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From control-unit plug term. 3 to throttle-valve switch term. 3
- Eliminate contact resistances in the plug-in connections.

If the resistance reading is still outside tolerance - replace throttle-valve switch.

Installation position of components:

- Control unit: In front-passenger footwell, at bottom right.
- Throttle-valve switch: On right on intake manifold.

C5

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

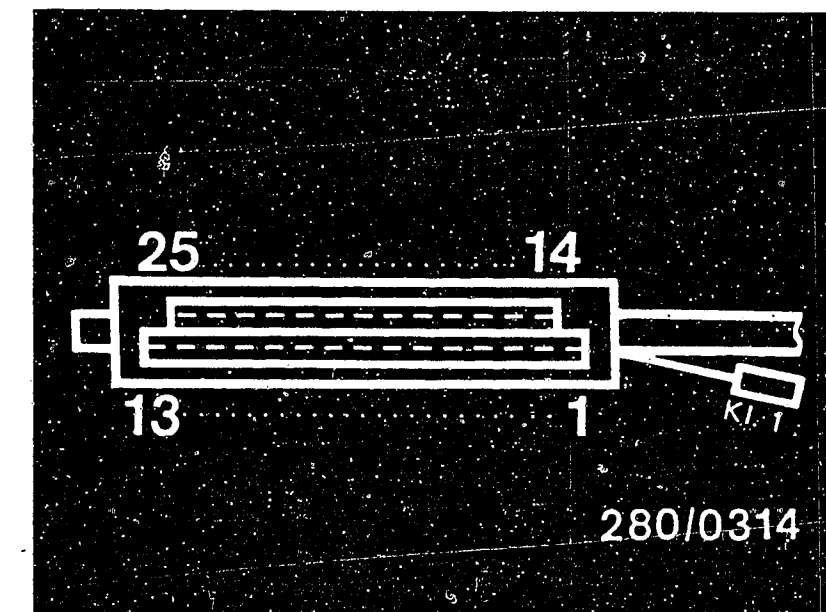


C6

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

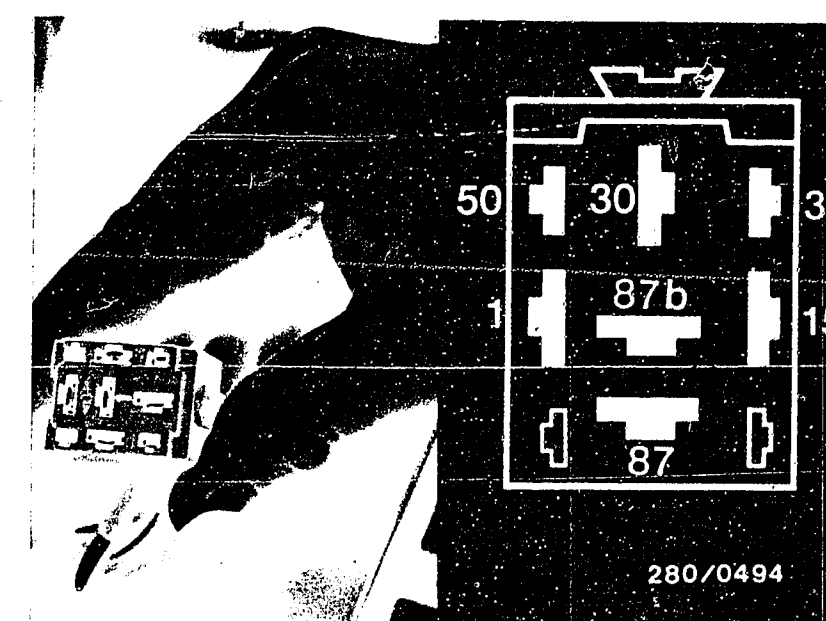


TEST STEP: 11			
Operation		Reading	Testing
Program switch "V" at position:	↓	Measuring equipment must indicate 8.2...10.9 Ω at +20°C 8.7...11.7 Ω at +80°C.	<u>Component:</u> Injection valves 1 2 and 3
Program switch " Ω " at position:	18		
Measuring equipment: motor- tester or multimeter			
Measuring range: x 1 Ω		Yes ↓ Continue testing with next test step.	<u>Operation:</u> Resistance of 3 injection valves (parallel) Group I.
Connection: Test sockets blue			<u>Malfunction:</u> Resistance outside tolerance
Operation in vehicle: ---			
		No ↓	



Top view of control-unit plug

Control relay disconnected
Top view of plug



Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0 Ω):

- From control-unit plug term. 12 to the injection valves.
- From the injection valves to control relay term. 87.
- Resistance measurement at injection valve:
at ambient temperature (+15°C...+30°C): 15...17.5 Ω
with engine at op. temp. (approx.+80°C): 17...20 Ω

If reading too high: valve coil has open circuit or a valve connector has dropped off. Check connection lugs for security. Eliminate contact resistances.

If necessary, replace injection valve(s).

Installation position of components

- Injection valves: in the intake ports.
- Control relay: in engine compartment, at center of firewall.

C7

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

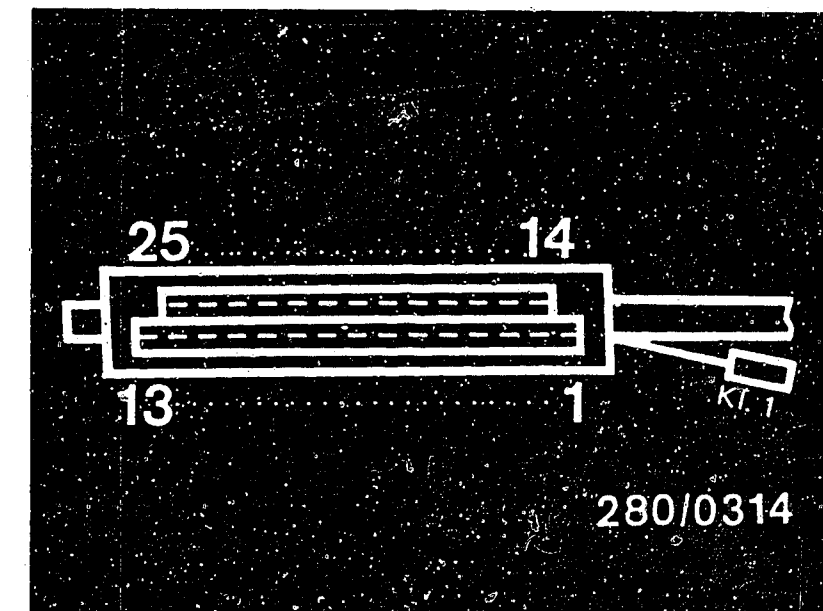


C8

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP 12				
Operation		Reading	Testing	
Program switch "V" at position:	↓	Measuring equipment must indicate 8.2 ... 10.9 Ω at +20°C 8.7 ... 11.7 Ω at +80°C.	Component: Injection valves 4,5 and 6	
Program switch "Ω" at position:	19		Operation: Resistance of 3 injection valves (parallel) Group II	
Measuring equipment: Motortester or multimeter		<div>yes</div> <div>Continue testing with test chart for idle-speed control.</div>	<div>no</div> <div>Resistance outside tolerance</div>	
Measuring range: x 1 Ω				
Connection: Test sockets blue				
Operation in vehicle: -----				



Top view of control-unit plug

Trouble-shooting:

For testing, remove control-unit plug from test adapter and use circuit diagram if necessary.

Test the following leads for continuity with ohmmeter (Set value approx. 0 Ω):

- From control-unit plug term. 24 to the injection valves.
- From the injection valves to control relay term. 87.
- Resistance measurement at injection valve:
At ambient temperature (+ 15°C ... + 30°C): 15 ... 17.5 Ω
With engine at op. temp. (approx. + 80°C) : 17 ... 20 Ω

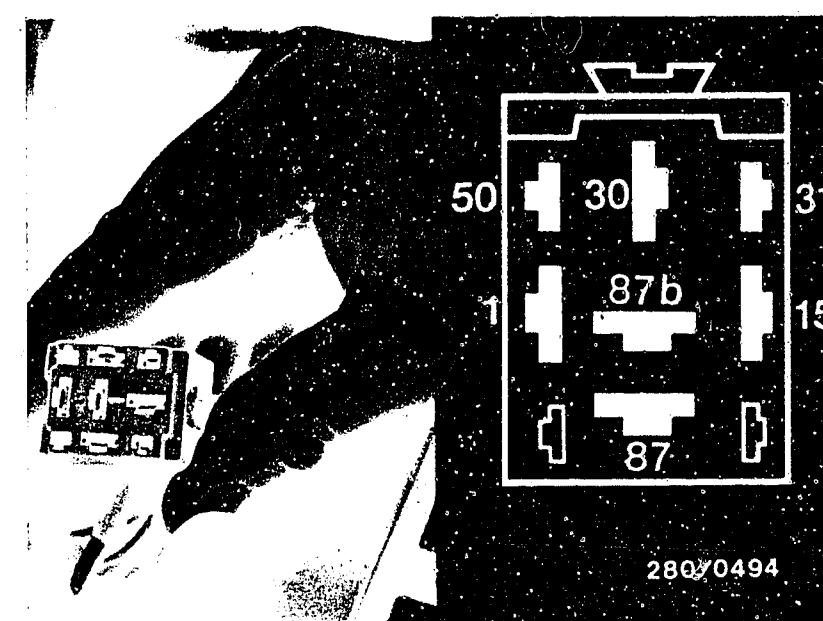
If reading too high: Valve coil has open circuit or a valve connector has dropped off. Check seating of plug-in lugs. Eliminate contact resistances.

If necessary, replace injection valve(s).

Installation position of components:

- Injection valves: In the intake ports.
- Control relay: In engine compartment, center of firewall.

Control relay disconnected.
Top view of plug



C9

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



C10

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST OF IDLE-SPEED CONTROL

with adapter lead 1 684 463 137.

- Before testing with the universal test adapter, check all multiple plug connectors for loose contacts.
Clean contacts if dirty or corroded.
- Watch for blade receptacles which have been pushed back.
If necessary, bend back the latching lug and press the blade receptacle as far as it will go into the plug housing; latching lug locks into position.
- Suspicion of line breaks in case of kinking and pinching.

The universal test adapter is used for testing the peripherals of the electrics in conjunction with the control unit.

Disconnect 6- and 8-pinplugs from idle controller (control unit) and connect to Y-adapter lead (ignition must be off).

To make measurements, connect a multimeter to the universal test adapter for measuring voltage and resistance, as well as a motortester.

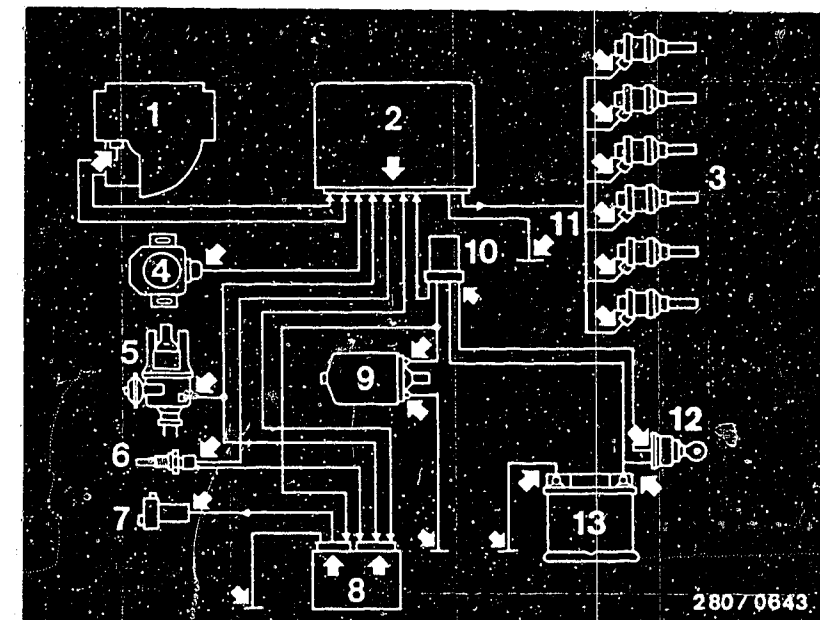
The individual test steps are selected by means of two program switches (one for voltage measurements and the other for resistance measurements).

Each program switch has 24 test positions. However, only some of these are occupied for the idle-speed control.

If a fault is found during a test, the test must be repeated after remedying the fault. The test with the universal test adapter must always be performed from beginning to end. Be sure to follow the instructions in the test chart.

- Test steps 1...3 measure voltages during starting.
Set multimeter to "voltage measuring range".
- Test steps 4...6 measure resistances.
Set multimeter to "resistance measuring range".

Test specifications and notes on how to operate the universal test adapter are given in the following test chart.



Electrical plug-in connections (arrows)

- 1 = Air-flow sensor
- 2 = Control unit
- 3 = Injection valves
- 4 = Throttle-valve switch
- 5 = Ignition distributor
- 6 = Double temperature sensor (engine temperature NTC II)
- 7 = Idle actuator
- 8 = Idle controller
- 9 = Electric fuel pump
- 10 = Control relay
- 11 = Central ground
- 12 = Ignition lock
- 13 = Battery

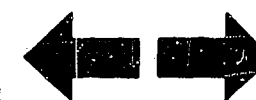
C11

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



C12

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP 1 - Idle controller (control unit) not connected.			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> at position:	5	Measuring equipment must indicate <u>ignition pulses.</u>	<u>Component:</u> Ignition system signal from term. 1
<u>Program switch "Ω"</u> at position:	-*		
<u>Measuring equipment:</u> ignition oscilloscope		<div><div></div><div>Yes</div><div>↓</div><div>Continue testing with <u>next test</u> <u>step.</u></div></div> <div><div></div><div>No</div><div>↓</div><div></div></div>	<u>Operation:</u> Voltage pulses, ener- gization of idle con- troller (control unit) by the ignition
<u>Measuring range:</u> Special input . Control stick up against left- hand stop and measuring range 20V			
<u>Connection:</u> Testwells			<u>Malfunction:</u> No reading
<u>Operation in vehicle:</u> Ignition "ON" and operate starting motor			

Trouble-shooting:

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value 0 Ω)

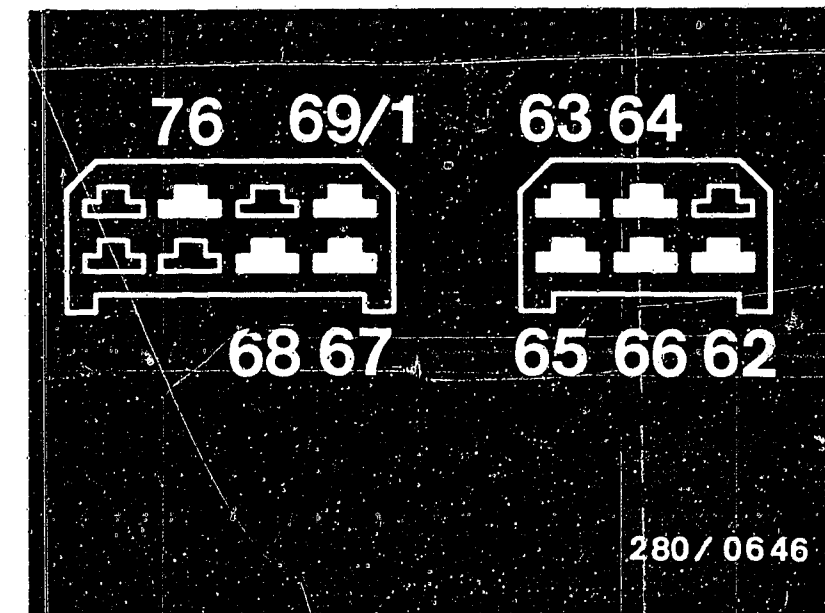
- From idle-controller plug term. 69/1 to ignition coil term. 1.
- From idle-controller plug term. 66 to central ground.
- Eliminate contact resistances in the plug-in connections.

If ignition pulse still not visible - test ignition system.

Installation position of components:

- Idle controller: In passenger compartment, in front-passenger footwell at bottom right.
- Central ground: On intake port of cylinder 6 at rear.

* Switch position not specified.



Top view of 6- and 8-pin idle-controller plugs



TEST STEP: 2			
Operation		Reading	Testing
Program switch "V" at position:	6	Measuring equipment must indicate <u>8 ... 15 V</u>	<u>Component:</u> Control relay, voltage supply
Program switch "Ω" at position:	—		
Measuring equipment: motor-tester or multimeter		<div> <div>Yes</div> <div>No</div> </div>	<u>Operation:</u> Voltage supply from term. 87b
Measuring range: 0...15 V			
<u>Connection:</u> test socket red (+) test socket black (-)			
<u>Operation in vehicle:</u> Ignition "ON" and operate starting motor			
		Continue testing with <u>next test step.</u>	<u>Malfunction:</u> No voltage reading

Trouble-shooting:

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

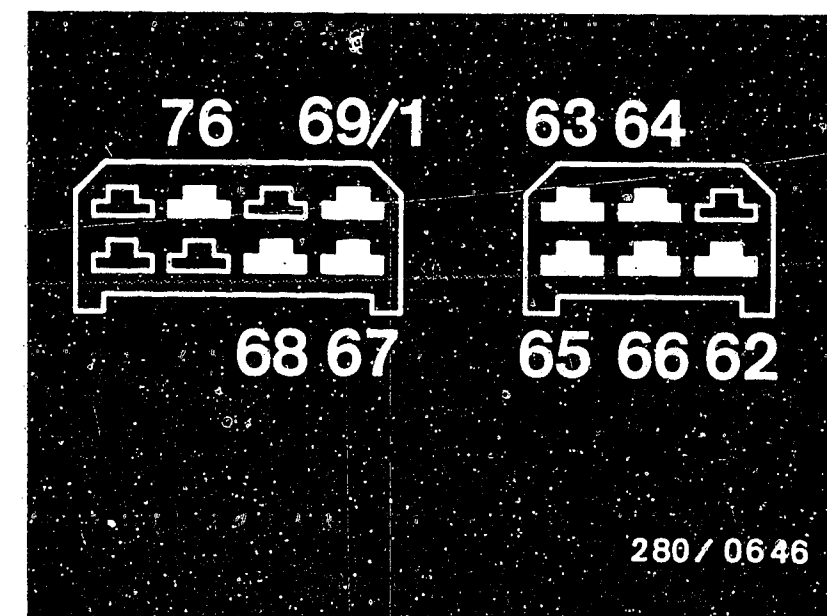
Using ohmmeter, test the following leads for continuity
(set value 0 Ω)

- From idle-controller plug term. 65 to control relay term. 87b.
- Eliminate contact resistances in the plug-in connections.

If ignition pulse still not visible - test ignition system.

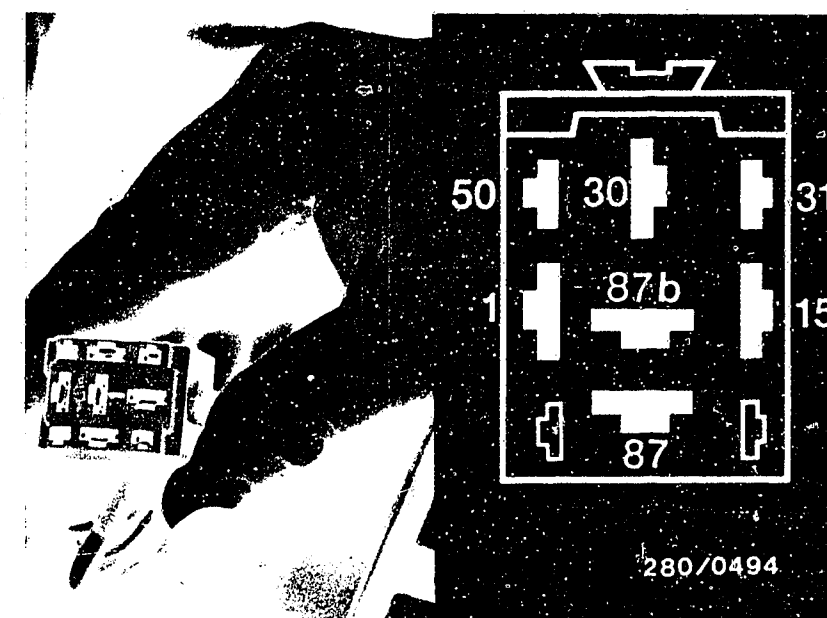
Installation position of components:

- Control unit: in passenger compartment, front passenger side in footwell at bottom right.
- Control relay: in engine compartment, center of firewall.



Top view of control-unit plug

Control relay disconnected
Top view of plug



C15

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

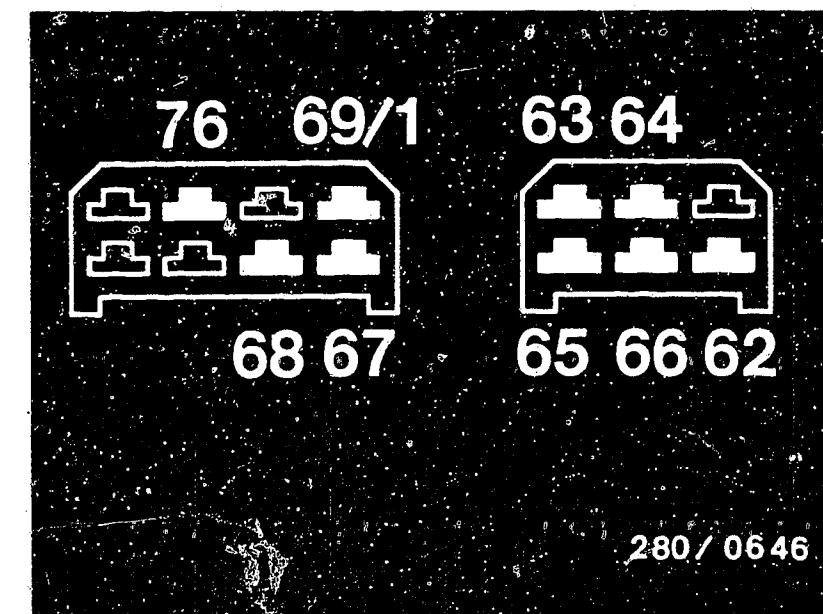


C16

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP 3 - Idle controller (control unit) connected to Y-adapter lead		
Operation	Reading	Testing
Program switch "V" at position:	7	Measuring equipment must indicate 8 ... 15 V.
Program switch "Ω" at position:	-	
Measuring equipment: Motortester or multimeter	<div> <div>yes</div> <div>no</div> </div>	Component: Throttle-valve switch (idle contact)
Measuring range: 0...15 V		
Connection: Test socket red (+) Test socket black (-)		Operation: Voltage through throttle-valve switch term. 2 and term. 18 (lead 9).
Operation in vehicle: Accelerator in rest position Ignition "ON" and start		Malfunction: No voltage reading



Top view of 6- and 8-pin idle-controller plugs

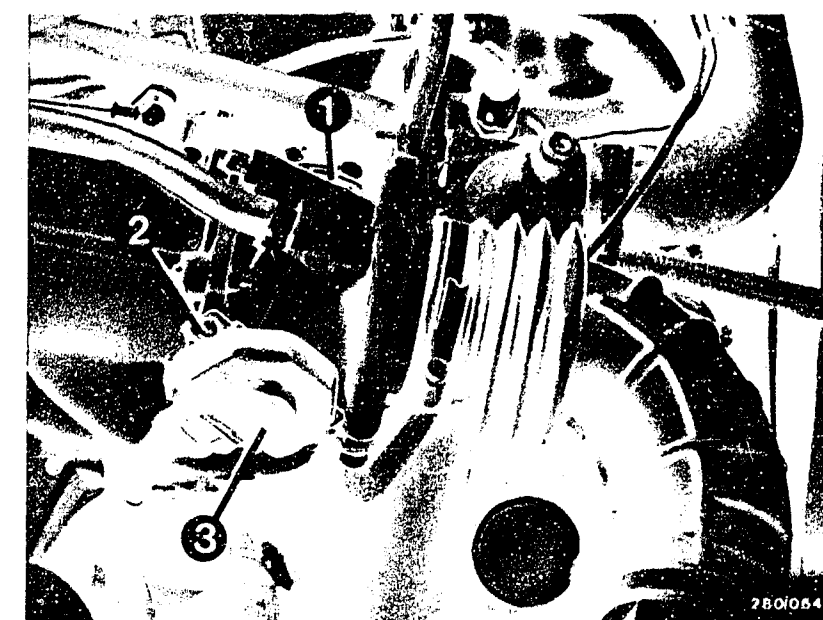
Trouble-shooting

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

Test the following leads for continuity with ohmmeter (Set value approx. 0 Ω):

- From idle-controller plug term. 68 to throttle-valve switch term. 2.
- Eliminate contact resistances in the plug-in connections.

- 1 = Throttle lever
- 2 = Fastening screws
- 3 = Throttle-valve switch



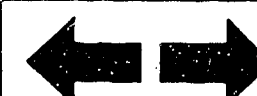
C17


Test chart for universal test adapter
Opel Senator, Monza 3.0 E

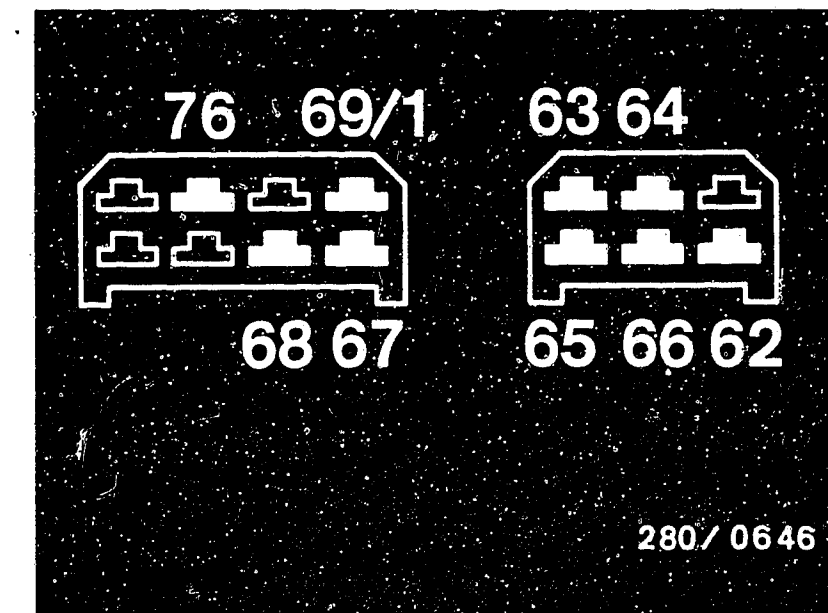


C18

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP: 4				
Operation		Reading	Testing	
Program switch "V" at position:		Measuring equipment must indicate at ambient temperature (+ 15°C ... + 30° C): <u>1.45 ... 3.3 kΩ</u> with engine at normal op. temp. (approx. +80° C) <u>280 ... 360 Ω</u>	Component: Double temperature sensor (engine temperature NTC II)	
Program switch "Ω" at position:	14		Operation: Resistance between idle- controller plug term. 65 and central ground, vehicle ground and tem- perature-sensor ground.	
Measuring equipment: motor- tester or multimeter				
Measuring range: x 10 Ω or x 100 Ω				
Connection: Test sockets blue		Yes		
Operation in vehicle: ---		no		
		Continue testing with next test step.		



Top view of 6- and 8-pin idle-controller plugs

Trouble-shooting

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

Measure resistance directly at double temperature sensor term. 67 (NTC II, white plug) and to ground on housing.

If the measured resistance is outside tolerance - replace temperature sensor.

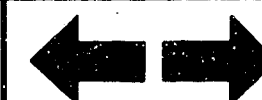
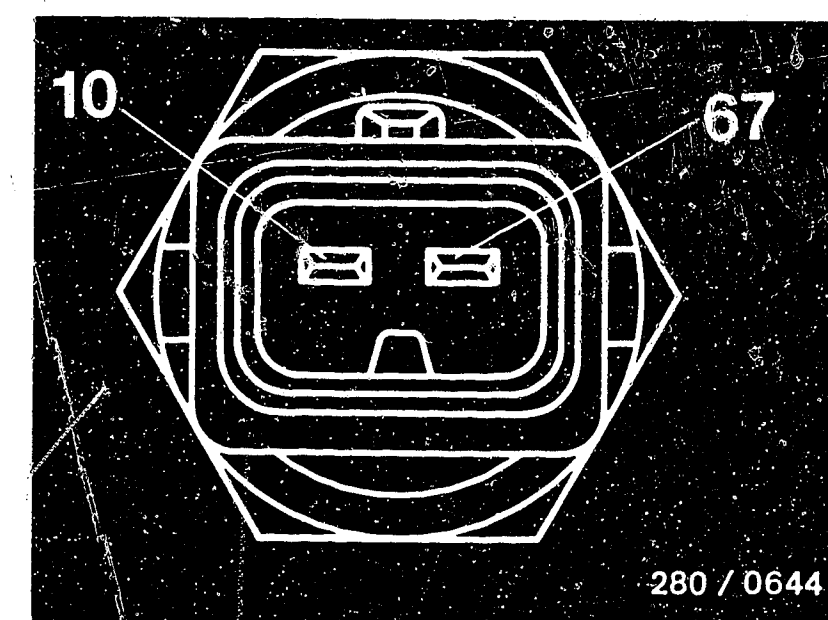
Using ohmmeter, test the following leads for continuity (set value 0 Ω)

- From idle-controller plug term. 67 to temperature sensor II (engine) term. 67.
- Ground contact of temperature-sensor housing to engine and to central ground.
- Eliminate contact resistances in the plug-in connections.

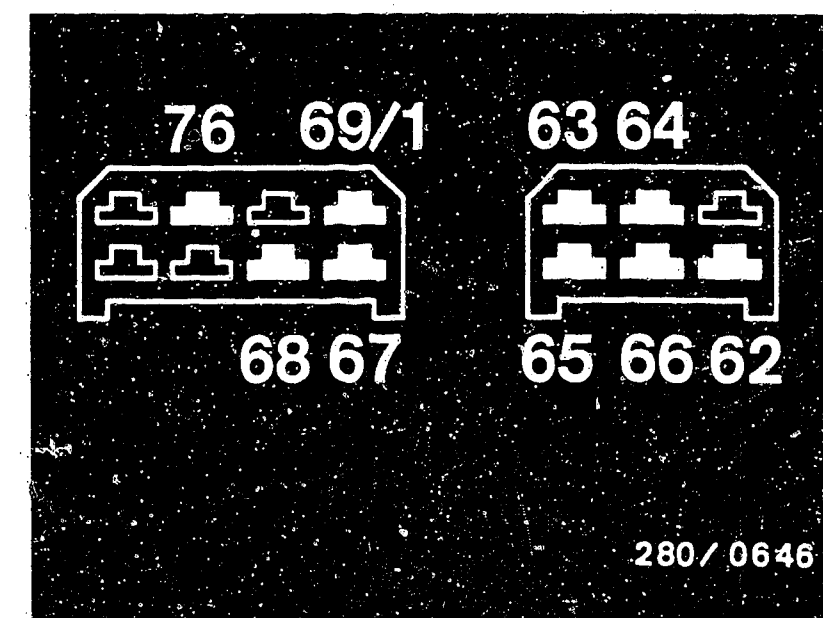
Installation position of components

- Temperature sensor II (engine): On engine block at front right (white plug)
- Central ground: On intake port of cylinder 6, at rear.
- Idle controller: In front passenger footwell, bottom right

Top view of connector of double temperature sensor



TEST STEP 5		Reading	Testing
Operation			
Program switch "V" at position:	↓	Measuring equipment must indicate	Component:
Program switch "Ω" at position:	20	13 ... 28 Ω.	Idle actuator Winding 1
Measuring equipment: Motortester or multimeter			Operation:
Measuring range: x 1 Ω			Resistance between idle controller plug term. 62 and term. 63
Connection: Test sockets blue		yes ↓	Malfunction: Resistance outside tolerance
Operation in vehicle: -----		no ↓	
		Continue testing with next test step.	



Top view of 6- and 8-pin idle-controller plugs

Trouble-shooting:

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

Measure resistance directly at idle actuator term. 62 and term. 63.

Test specification: 11 ... 15 Ω

If the measured resistance is outside tolerance, replace idle actuator.

Test the following leads for continuity with ohmmeter
(Set value approx. 0 Ω):

- From idle-controller plug term. 62 to idle actuator term. 62.
- From idle-controller plug term. 63 to idle actuator term. 63.
- Eliminate contact resistances in the plug-in connections.

- 1 = Idle-speed adjusting screw
- 2 = Idle actuator



C21

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

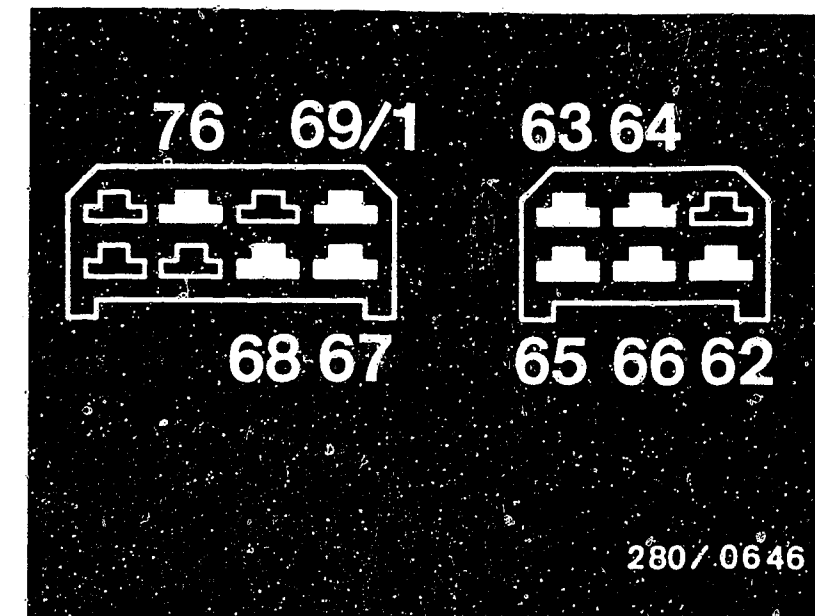


C22

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



TEST STEP 6		Reading	Testing
Operation			
Program switch "V" at position:	↓	Measuring equipment must indicate	Component:
Program switch "Ω" at position:	21	13 ... 28 Ω.	Idle actuator Winding 2
Measuring equipment: Motortester or multimeter			Operation:
Measuring range: x 1 Ω			Resistance between idle controller plug term. 64 and term. 63
Connection: Test sockets blue		yes ↓	Malfunction: Resistance outside tolerance
Operation in vehicle: -----		no ↓	
		Continue testing with next test step.	



Top view of 6- and 8-pin idle-controller plugs

Trouble-shooting:

For testing, remove 6- and 8-pin idle-controller plugs from test adapter and use circuit diagram if necessary.

Measure resistance directly at idle actuator term. 64 and term. 63

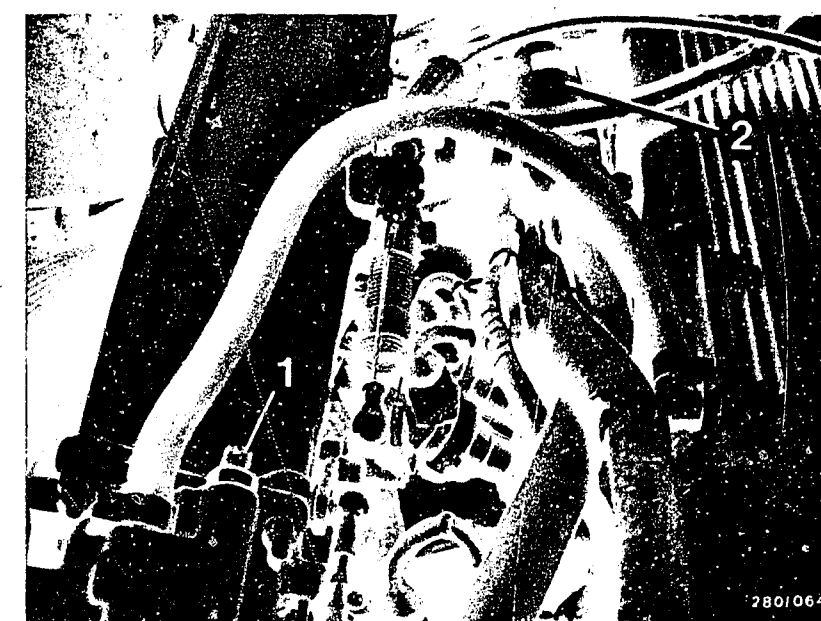
Test specification: 11 ... 15 Ω

If the measured resistance is outside tolerance, replace idle actuator.

Test the following leads for continuity with ohmmeter
(Set value approx. 0 Ω):

- From idle-controller plug term. 63 to idle actuator term. 64.
- Eliminate contact resistances in the plug-in connections.

- 1 = Idle-speed adjusting screw
- 2 = Idle actuator



C23

Test chart for universal test adapter
Opel Senator, Monza 3.0 E

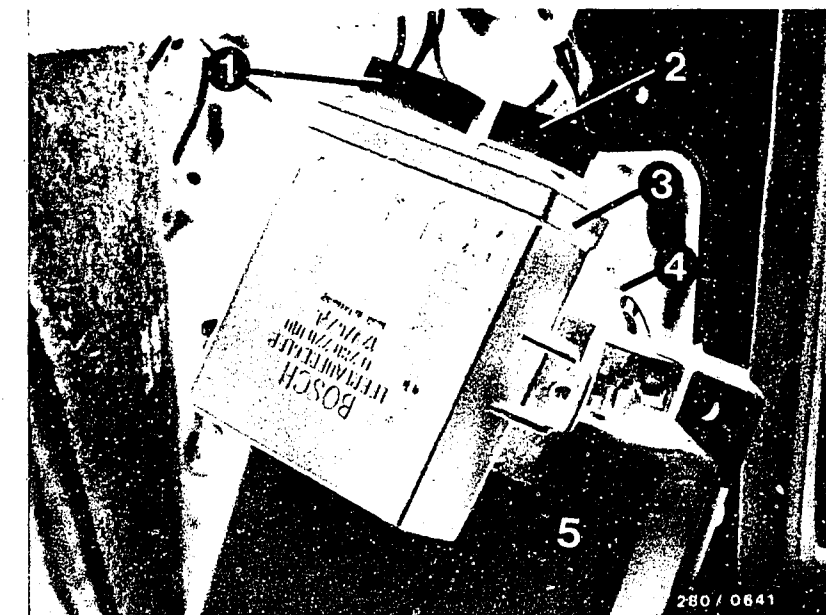


C24

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



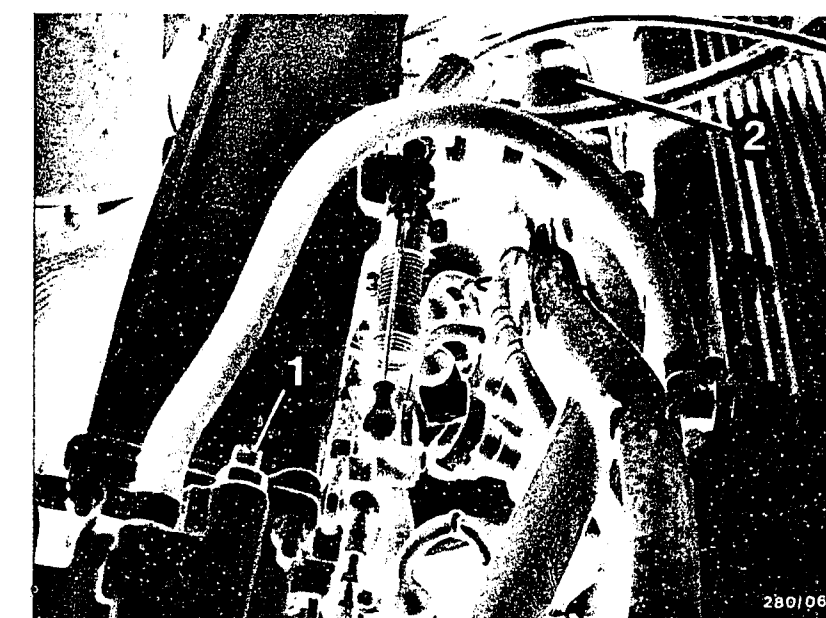
TEST STEP 7			
Operation		Reading	Testing
Program switch "V" at position:	↓	Measuring equipment must indicate	Components:
Program switch "Ω" at position:	21	30 ... 34% at idle speed.	Idle controller Idle actuator
Measuring equipment: Dwell-angle tester		Idle speed	Operation:
Measuring range: 100%		Man.-shifted trans.: 775 ... 825 min ⁻¹	Basic setting of idle-speed control
Connection: Test sockets 1 and 2, black		Automatic trans: 675 ... 725 min ⁻¹	Malfunction: On/off ratio outside tolerance
Operation in vehicle: Engine at operating temperature (approx. +80°C) Accelerator in rest position.		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> yes ↓ </div> <div style="text-align: center;"> no ↓ </div> </div>	
		The electrical test with the universal test adapter is completed.	



Idle-speed control

- 1 = 8-pin plug
- 2 = 6-pin plug
- 3 = Idle controller (control unit) LE-Jetronic
- 4 = 25-pin control-unit plug
- 5 = Control unit

- 1 = Idle-speed adjusting screw
- 2 = Idle actuator



Trouble-shooting:

Make sure that the engine is not drawing in any unmetered air.

Adjust idle-speed adjusting screw (throttle-valve bypass) so that the on/off ratio is inside tolerance.

- On/off ratio does not change, idle speed changes:
Idle controller (control unit) defective, replace.
- On/off ratio and idle speed change:
Idle actuator defective replace.

When accelerating, the on/off ratio must change noticeably; at idle speed it must be 30 ... 34 %.

D1

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



D2

Test chart for universal test adapter
Opel Senator, Monza 3.0 E



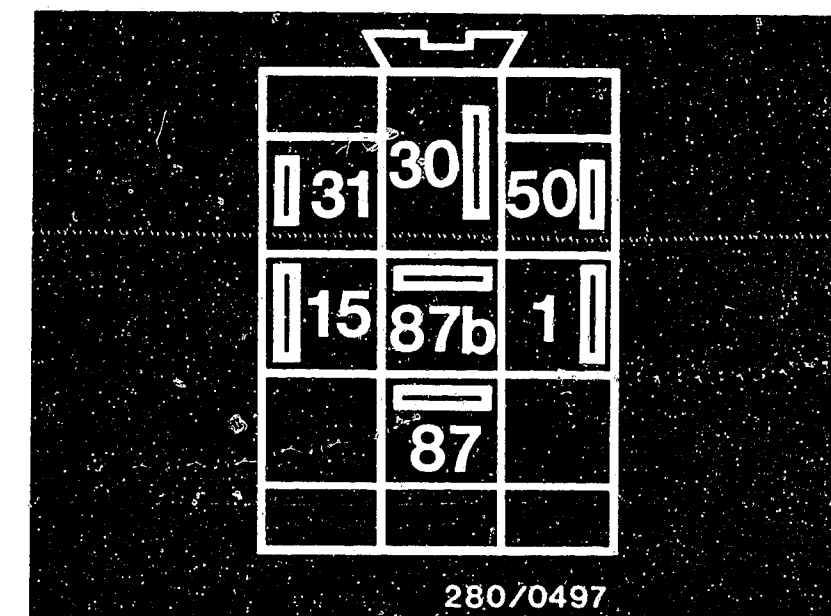
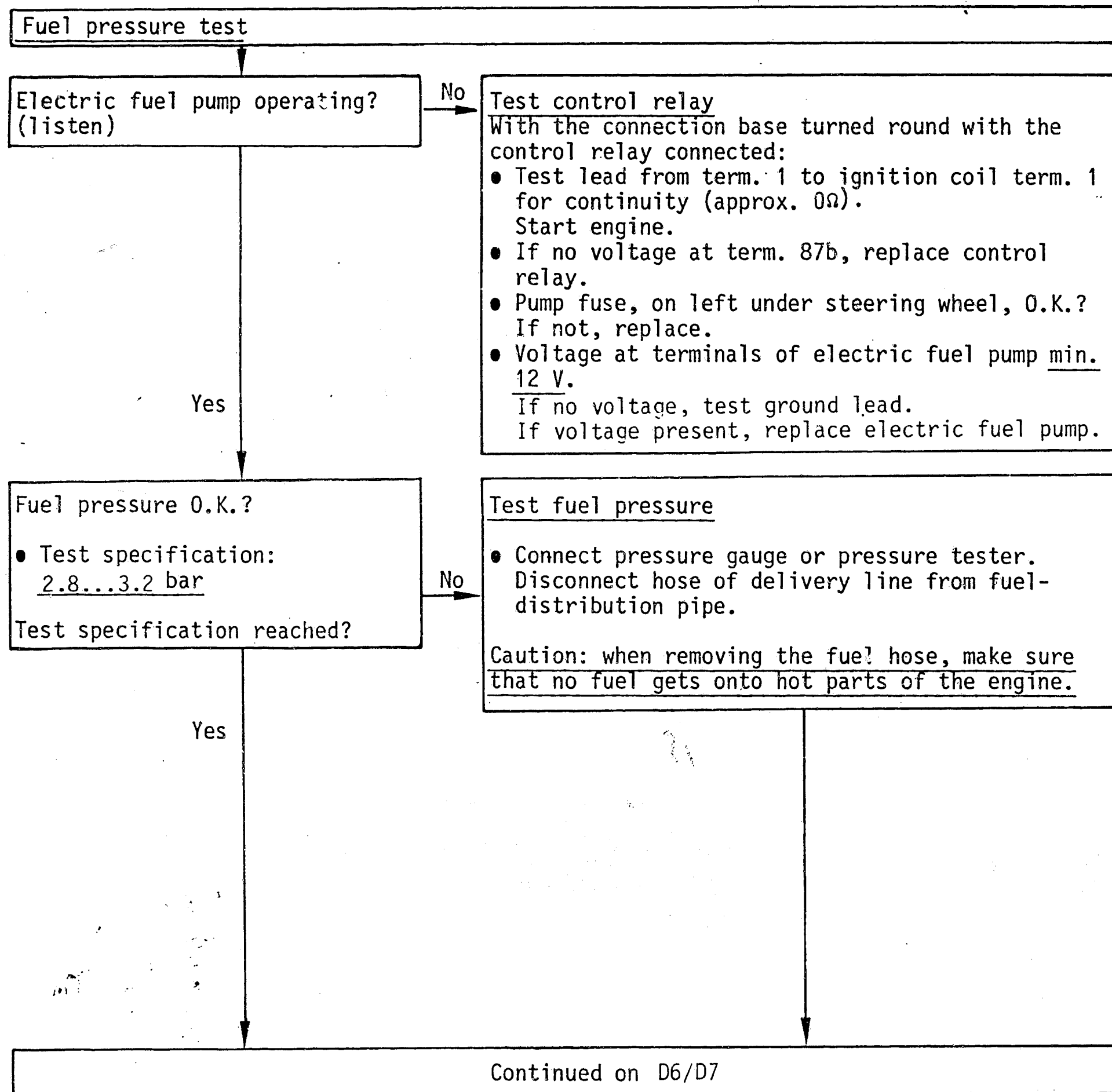
The electrical test with the universal test adapter is now completed.

The fuel pressure test must now be performed.

D3

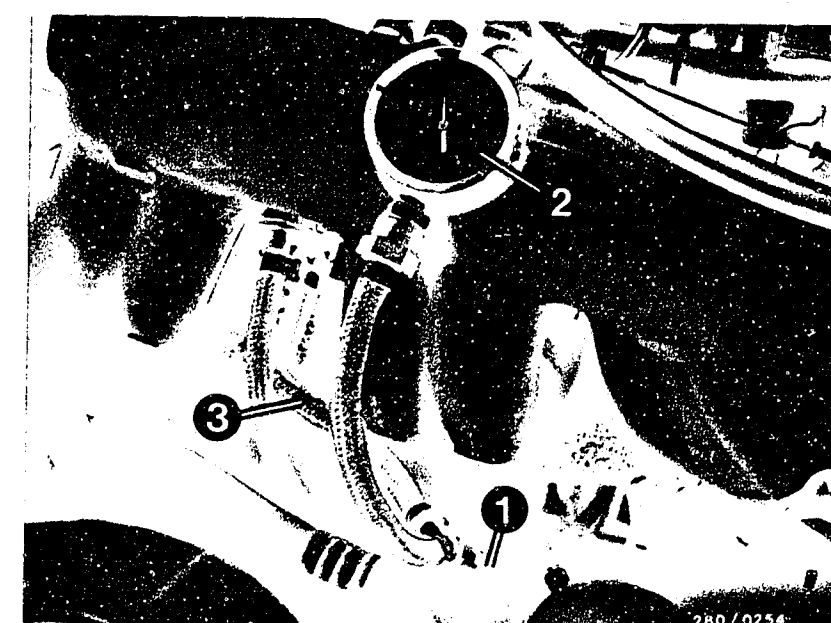
Test chart for universal test adapter
Opel Senator, Monza 3.0 E





Back of control relay connection base

- 1 = To connection (pressure side)
 2 = Pressure gauge
 3 = Fuel delivery line



D4

Fuel pressure test
 Opel Senator, Monza 3.0 E



D5

Fuel pressure test
 Opel Senator, Monza 3.0 E



Fuel pressure test (continued)

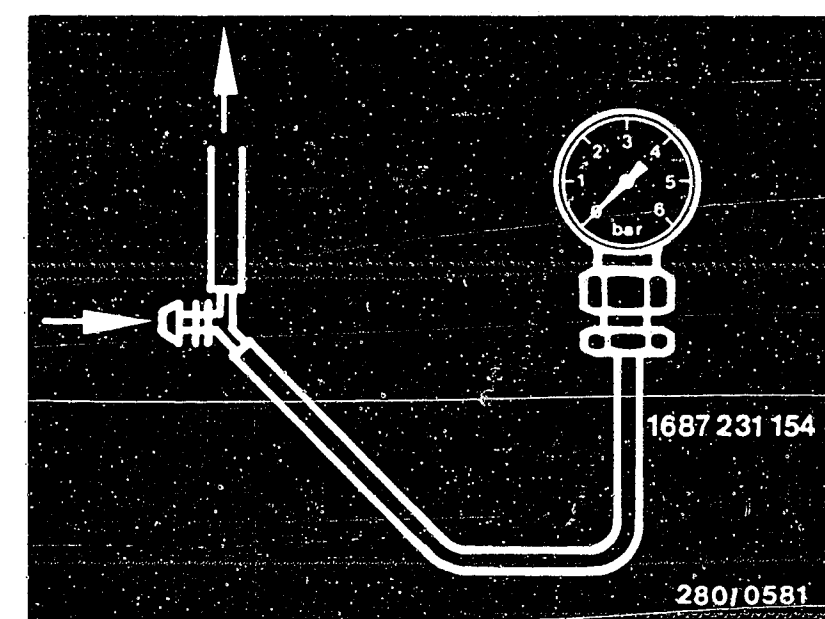
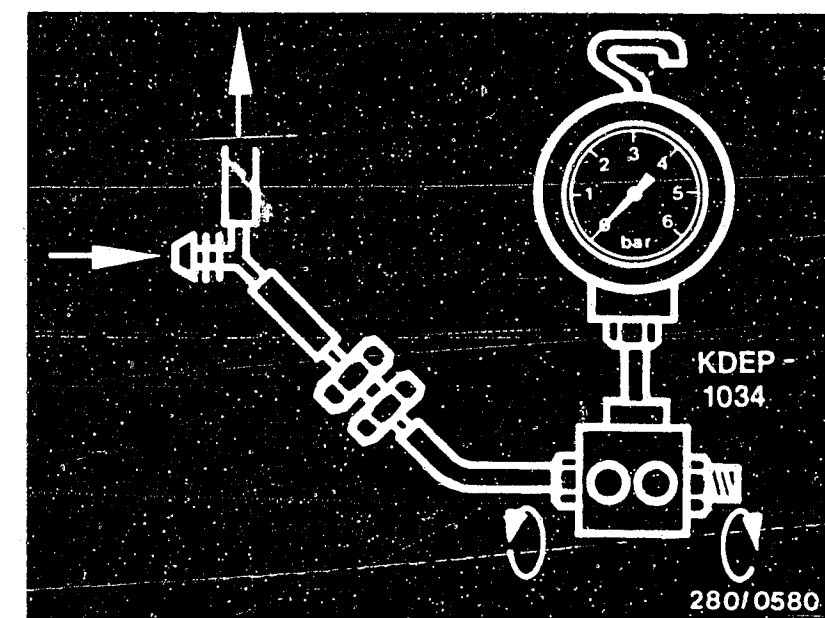
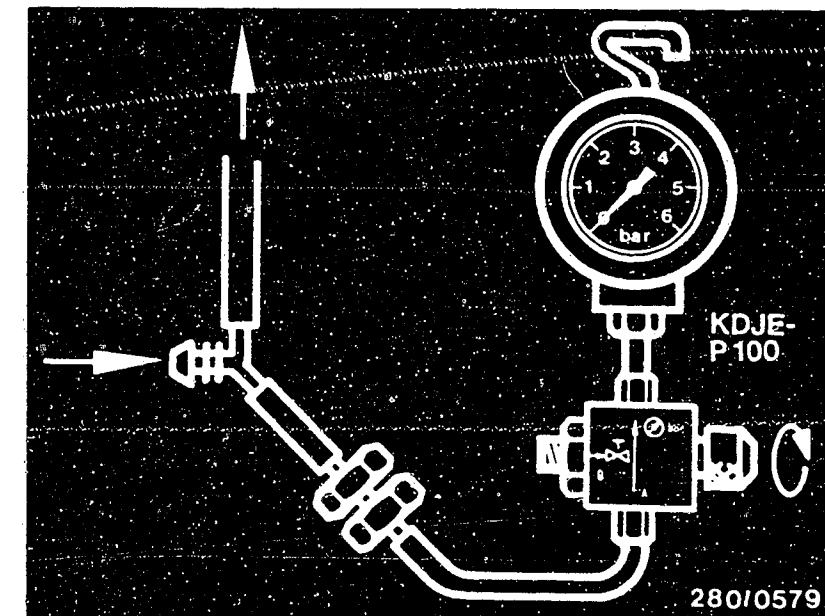
Test fuel pressure

Connect connections of pressure tester into fuel delivery line. If using pressure tester KDJE-P 100, close the hollow screw; on KDEP 1034 close only the right-hand screw. The end of the hose is plugged onto the fuel-distribution pipe, and the free Y-piece connection is plugged onto the fuel delivery hose.

Make sure there are no leaks.

Yes

Continued on D8/D9



D6

Fuel pressure test

Opel Senator, Monza 3.0 E

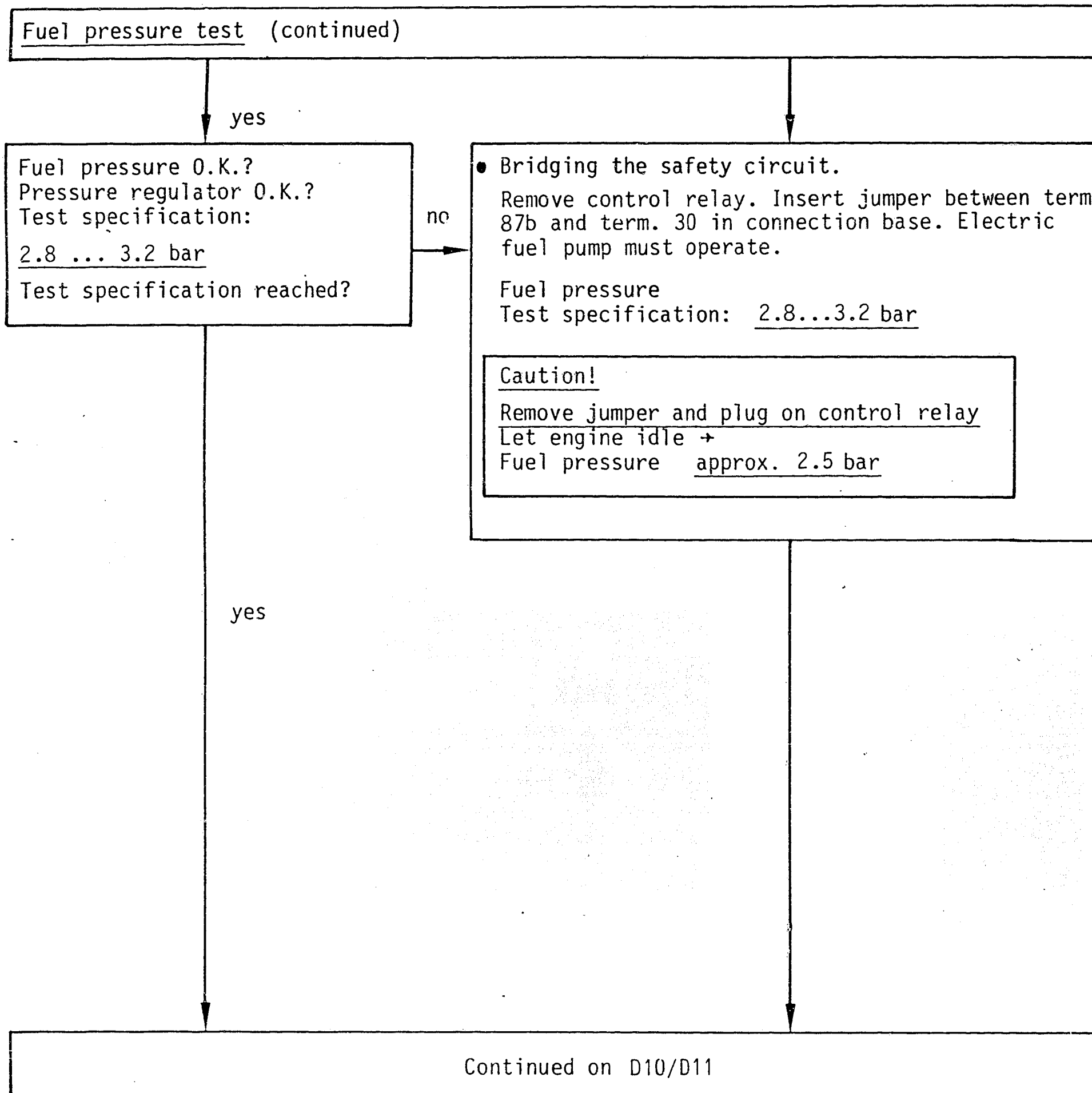


D7

Fuel pressure test

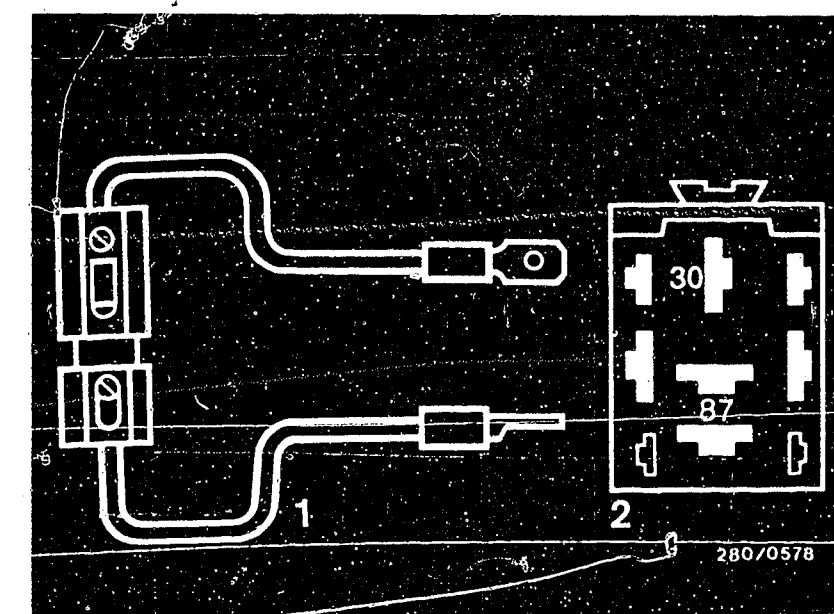
Opel Senator, Monza 3.0 E





Arrow = Control relay in engine compartment, center of firewall.

1 = Jumper with fuse holder and 10A fuse
2 = Top view of connection base



D8

Fuel pressure test
Opel Senator, Monza 3.0 E



D9

Fuel pressure test
Opel Senator, Monza 3.0 E



Fuel pressure test (continued)

- Test pressure regulator
Fuel pressure
Test specification: 2.8...3.2 bar

Fuel pressure of 2.8 bar not reached:

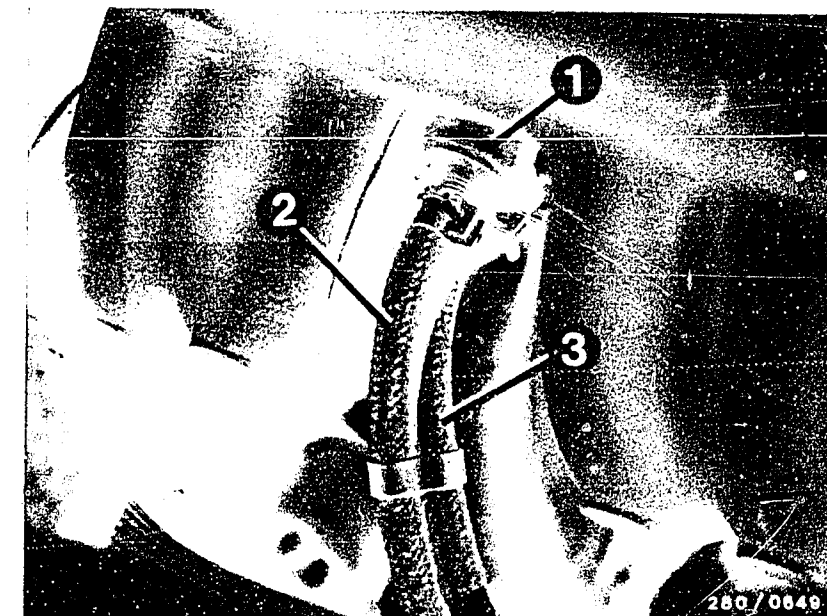
- Slowly pinch off fuel return line.
Caution: do not load pressure gauge above 6 bar.
If pressure rises above 4 bar - replace pressure regulator. The fuel pressure regulator is mounted on the fuel-distribution pipe by a hose piece.
- Fuel delivery line, fuel filter or pressure damper clogged.
- Strainer in tank clogged.
- Corrosion in tank

Fuel pressure of 3.2 bar exceeded:

- Fuel return line clogged or constricted.
- Replace pressure regulator.

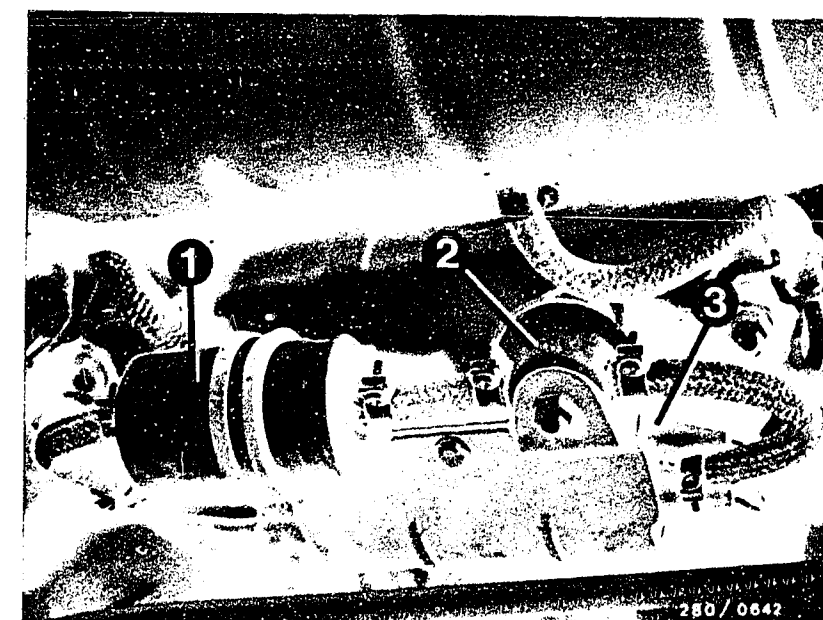
Yes

Continued on D12/D13



- 1 = Pressure regulator
- 2 = Return line
- 3 = Delivery line

- 1 = Fuel filter
- 2 = Pressure damper
- 3 = Electric fuel pump



D10

Fuel pressure test

Opel Senator, Monza 3.0 E



D11

Fuel pressure test

Opel Senator, Monza 3.0 E



Fuel pressure test (continued)

Does fuel pressure remain almost constant after stopping the engine?

No

The fuel pressure drops quickly after stopping the hot engine.

- Test fuel system for leaks:
Fuel pressure: 2.8...3.2 bar

Remove jumper and observe pressure gauge.
After approx. 20 min. the fuel pressure must still be min. 1.0 bar.

If not:

- Check joints between components and fuel hoses/lines for leaks.
- Pressure regulator (diaphragm)
- Injection valves (needle seat, valve not closing properly)
- Electric fuel pump (leaky non-return valve)
- Pressure damper or fuel filter leaking.

Yes

Remove pressure gauge. Re-establish connection between fuel delivery line and fuel-distribution pipe.

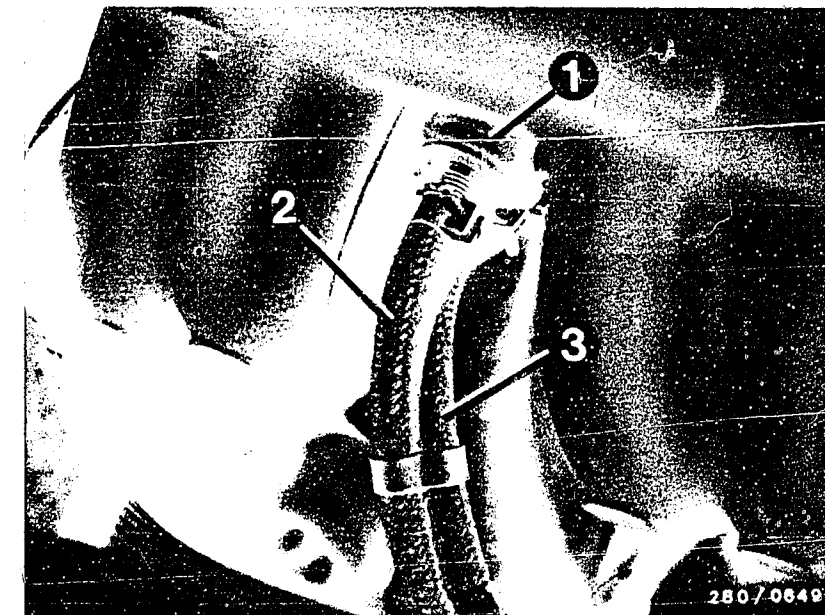
Remove jumper and fit control relay in connection base.

The fuel pressure test is completed.

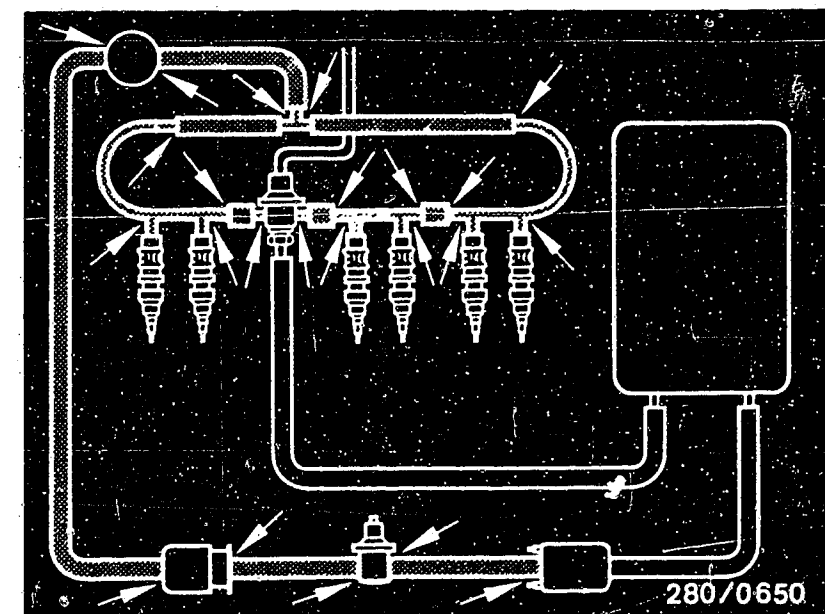
If the fault has not been found or if further instructions and information are required on how to remedy the fault, continue according to the trouble-shooting chart of your choice.

Detailed trouble-shooting chart (Coordinates B3...B4)

Direct trouble-shooting chart (Coordinates B5...B8)



- 1 = Pressure regulator
- 2 = Return line
- 3 = Delivery line



D12

Fuel pressure test

Opel Senator, Monza 3.0 E



D13

Fuel pressure test

Opel Senator, Monza 3.0 E



STARTING MOTOR OPERATES, ENGINE FAILS TO START OR STARTS ONLY WITH GREAT DIFFICULTY

Trouble-shooting program according to customer complaints

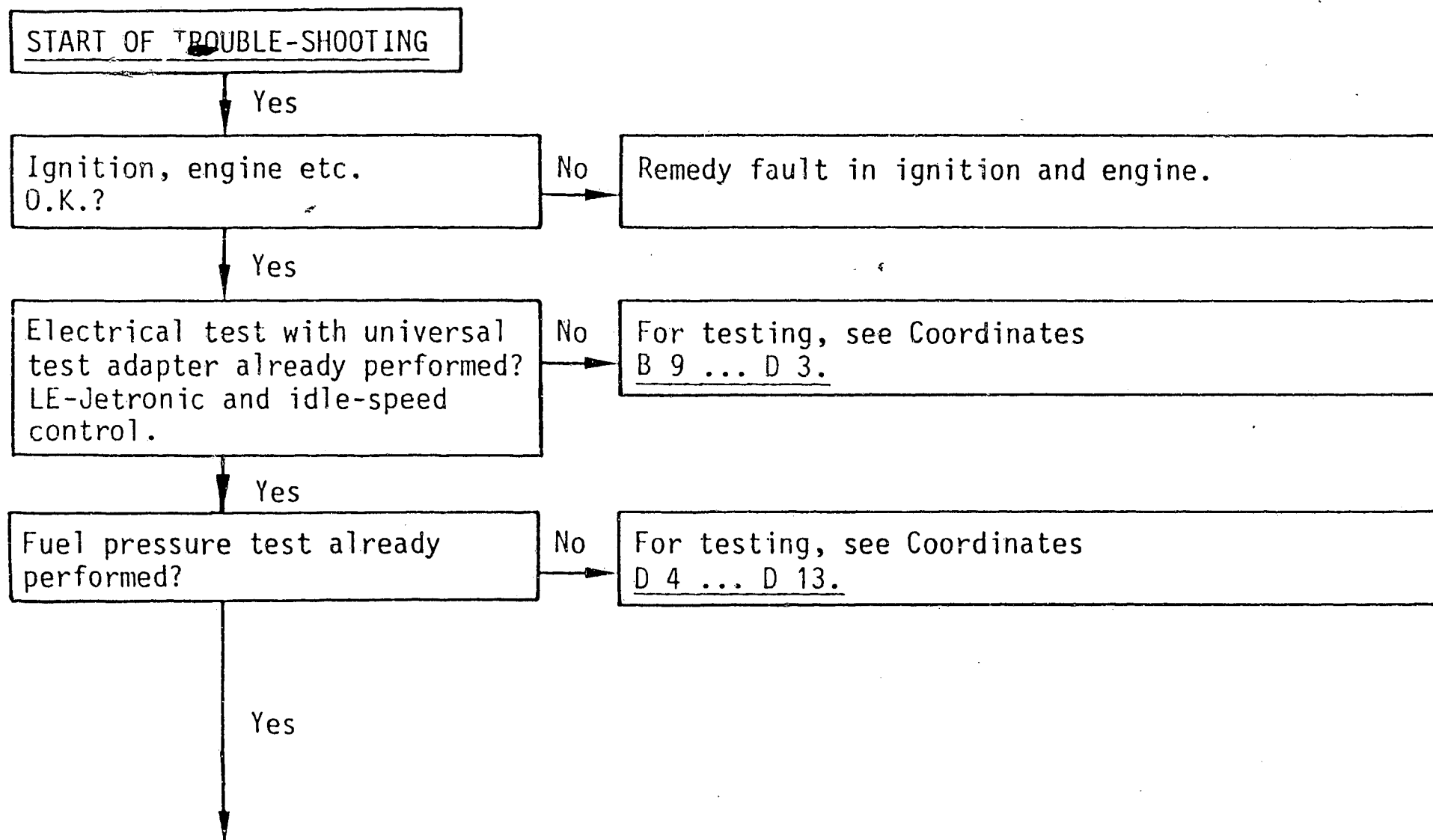
How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on D16/D17

D14

Engine fails to start

Opel Senator, Monza 3.0 E



D15

Engine fails to start

Opel Senator, Monza 3.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Test cold-start control
(control-unit function).

- Does voltage across injection valve drop from approx. 7 V to approx. 0.5 V during starting?
(with engine at operating temperature < 0.5 V)

No

Functional test:

- Remove control relay.
- Insert jumper between term. 30 and term. 87 in connection base. (Power supply to the control unit and the injection valves).

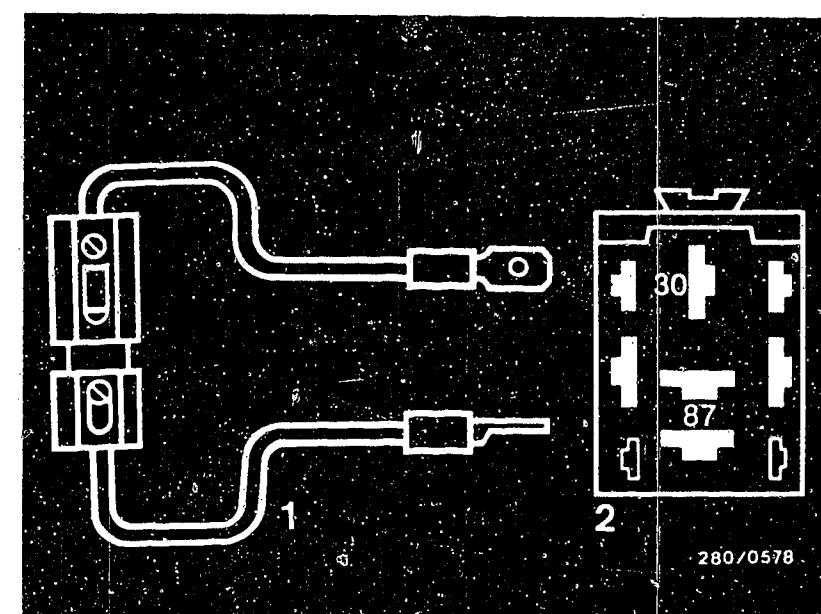
Yes

Continued on D18/D19



Arrow = Control relay in engine compartment, center of firewall.

1 = Jumper with fuse holder and 10A fuse (user-fabricated)
2 = Top view of connection base



D 16

Engine fails to start
Opel Senator, Monza 3.0 E



D 17

Engine fails to start
Opel Senator, Monza 3.0 E

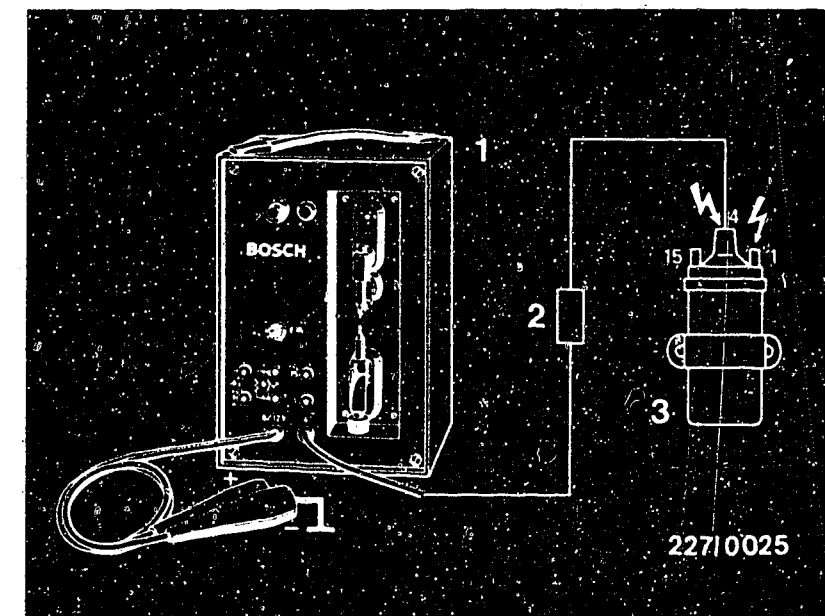


Starting motor operates, engine fails to start or starts only with great difficulty
(continued)


- Remove ignition cable term. 4 from distributor cap and connect with spark gap to vehicle ground. (Caution! Engine must not start).

Caution:

To prevent irreparable damage to the trigger box, when using a spark gap, an interference-suppression resistor of at least 2 k Ω must be connected between spark gap and ignition coil term. 4, e.g. sleeve-type suppressor (5 k Ω) 0 356 500 001.



- 1 = Spark gap
- 2 = 5 k Ω sleeve-type suppressor
- 3 = Ignition coil

 = Dangerous voltages
(400 V - 25 kV)

Yes

Continued on D20/D21

D 18

Engine fails to start
Opel Senator, Monza 3.0 E



D 19

Engine fails to start
Opel Senator, Monza 3.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

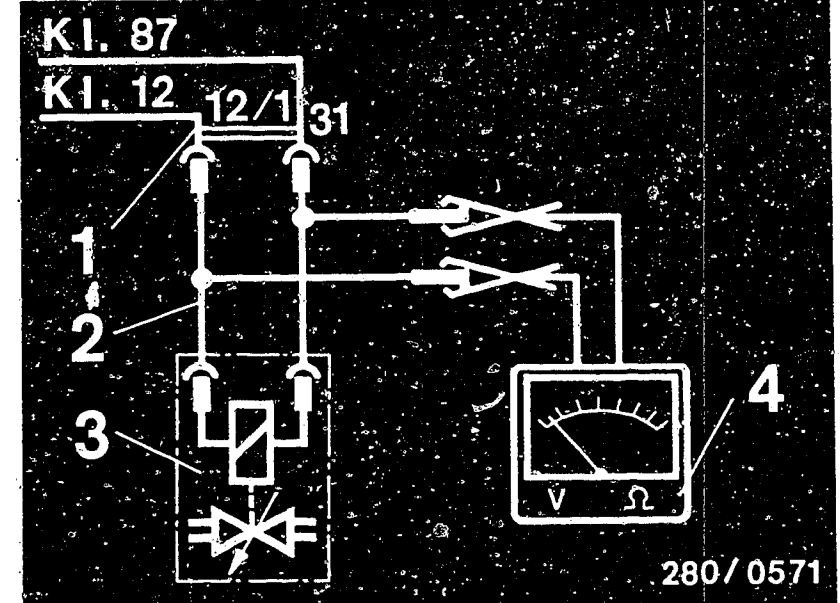
- Connect 2-pole adapter lead 1 684 463 093 between an injection valve and its electrical connecting cable.
- Connect multimeter to free measuring poles. Measuring range approx. 10 V.
- Remove plug from temperature sensor II (engine) (blue temperature sensor)

Measuring:

- Start engine.
- Voltage reading drops from initially approx. 7 V to approx. 0.5 V within approx. 15 s cranking time.
- If voltage values not reached - replace control unit.
Wait one minute before repeating test.
- Connect plug to temperature sensor.
If engine at operating temperature, operate starting motor.
- Voltage reading less than 0.5 V.
- If not, replace temperature sensor II.

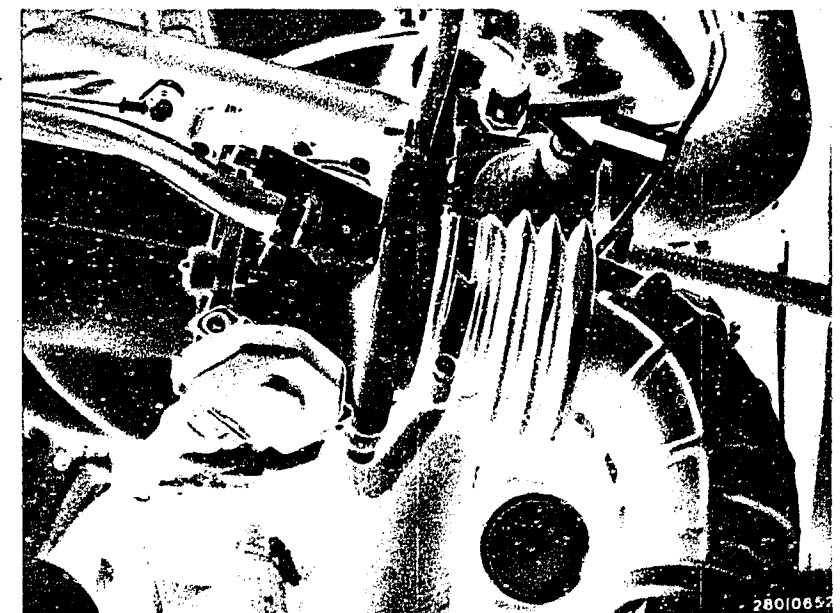
Yes

Continued on D22/D23



- 1 = Connector of valve line
- 2 = Adapter lead 1 684 463 098
- 3 = Injection valve
- 4 = Multimeter
- Term. 87 = From control relay
- Term. 12 = From control unit

Arrow = Temperature sensor II (engine) on coolant distributor at front right



D20

Engine fails to start
Opel Senator, Monza 3.0 E



D21

Engine fails to start
Opel Senator, Monza 3.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Test idle actuator mechanically.

- Engine-speed drop when hose pinched off?
(Engine cold)
- Does idle actuator vibrate with engine running?

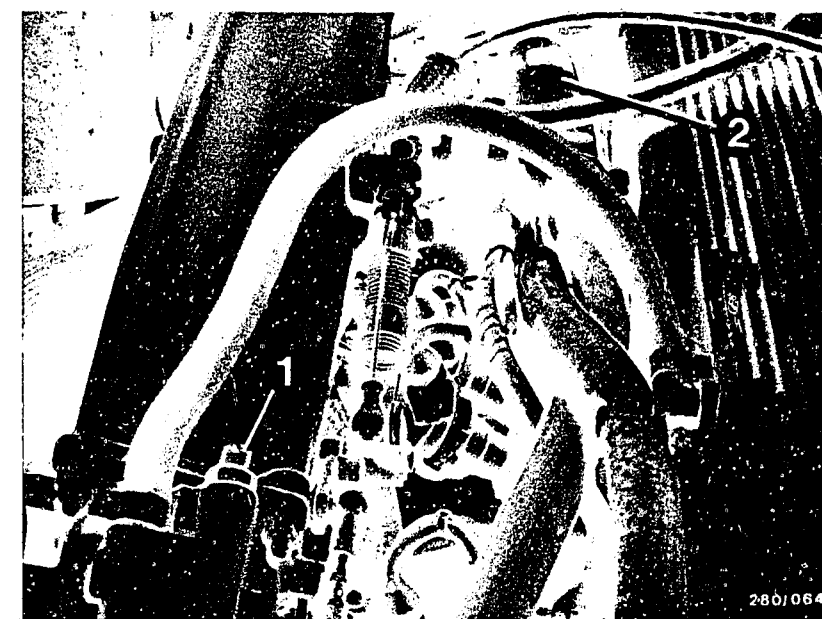
no

Functional test of idle actuator

- With engine cold, pinch off hose to idle actuator.
Engine speed must drop noticeably.
 - Idle actuator must vibrate noticeably with the engine running.
- If not, replace idle actuator.

Yes

Continued on E1/E2



1 = Idle-speed adjusting screw

2 = Idle actuator

D22

Engine fails to start
Opel Senator, Monza 3.0 E



D23

Engine fails to start
Opel Senator, Monza e.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):

60...1000 Ω

No

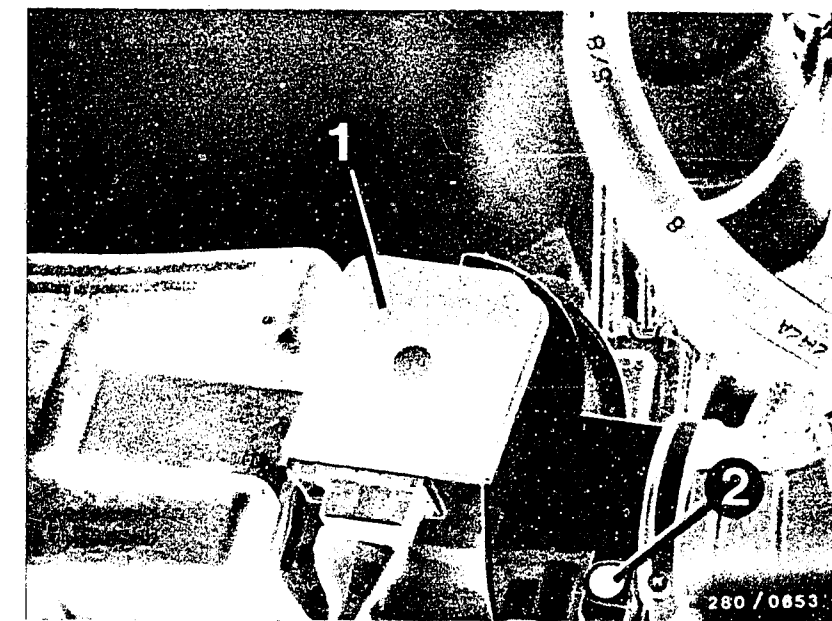
Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.
- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced.
- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.
Test specification: 160...300 Ω
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.
Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

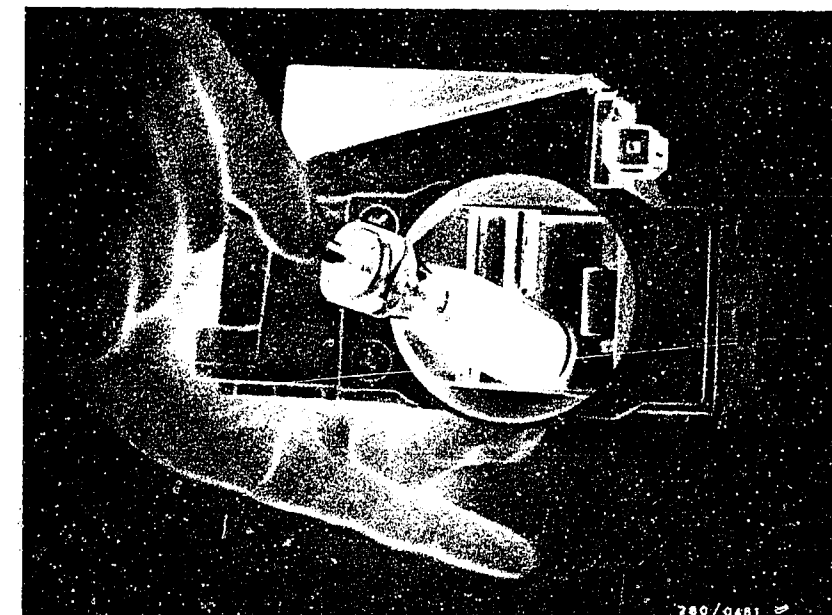
Yes

Continued on E3/E4



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



E1

Engine fails to start

Opel Senator, Monza 3.0 E



E2

Engine fails to start

Opel Senator, Monza 3.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Check air-intake system for leaks.

- Are all hose lines correctly attached? (Visual examination).
- Hoses kinked or damaged?
- Air-intake system tested for leaks with 0.3 bar gauge pressure?

no

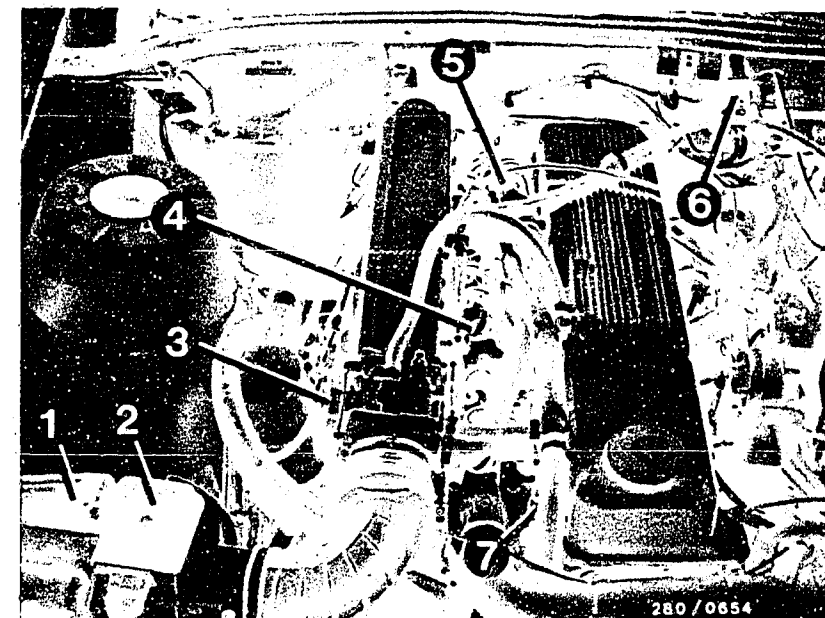
- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

• Leak test:

Seal off exhaust tail pipe.
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Disconnect hose after idle actuator and blow air (0.3 bar gauge pressure) into the intake manifold with compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc. Bubbling or foaming indicates a leak.

Yes

Continued on E5/E6



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor (engine temperature NTC II)

E3

Engine fails to start
Opel Senator, Monza 3.0 E



E4

Engine fails to start
Opel Senator, Monza 3.0 E



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Trouble-shooting program for
customer complaint

"Starting motor operates,
engine fails to start or starts
only with great difficulty"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed
(see Coordinates B 3...B 8).
If the fault has not been detected by "direct
trouble-shooting", see "detailed trouble-
shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression,
valve setting, valve timing, worn camshaft).

E5

Engine fails to start

Opel Senator, Monza 3.0 E



E6

Engine fails to start

Opel Senator, Monza 3.0 E



ENGINE STARTS BUT THEN DIES

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

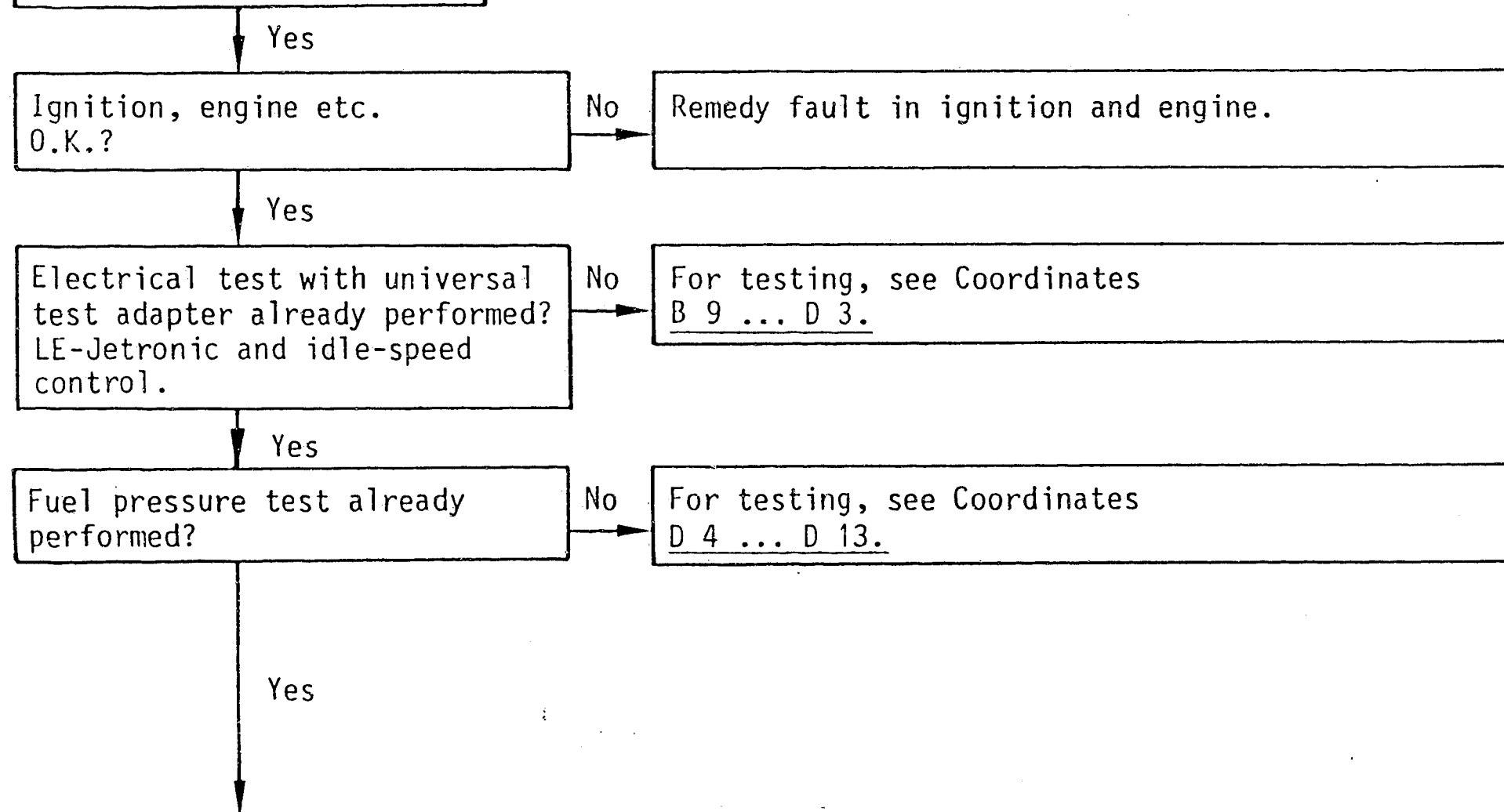
The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING



Continued on E9/E10

E7

Engine starts but then dies
Opel Senator, Monza 3.0 E



E8

Engine starts but then dies
Opel Senator, Monza 3.0 E



Engine starts but then dies (continued)

Yes

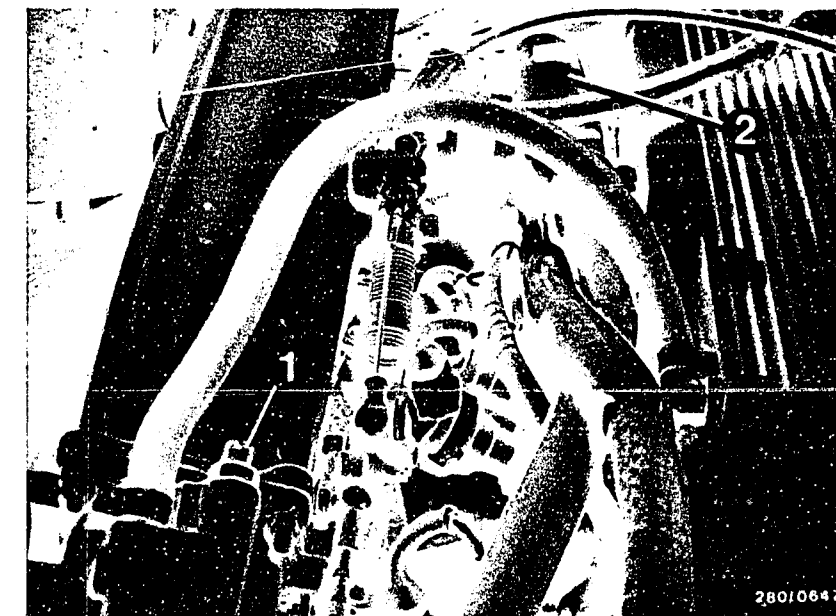
Test idle actuator mechanically.

- Engine-speed drop when hose pinched off? (Engine cold)
- Does idle actuator vibrate with engine running?

no

Functional test of idle actuator

- With engine cold, pinch off hose to idle actuator. Engine speed must drop noticeably.
 - Idle actuator must vibrate noticeably with the engine running.
- If not, replace idle actuator.



1 = Idle-speed adjusting screw
2 = Idle actuator

Yes

Continued on E11/E12

E9

Engine starts but then dies
Opel Senator, Monza 3.0 E



E10

Engine starts but then dies
Opel Senator, Monza 3.0 E



Engine starts but then dies (continued)

Yes

Check air-intake system for leaks.

- Are all hose lines correctly attached.
(Visual examination.)
- Hoses kinked or damaged?
- Air-intake system tested for leaks with 0.3 bar gauge pressure.

No

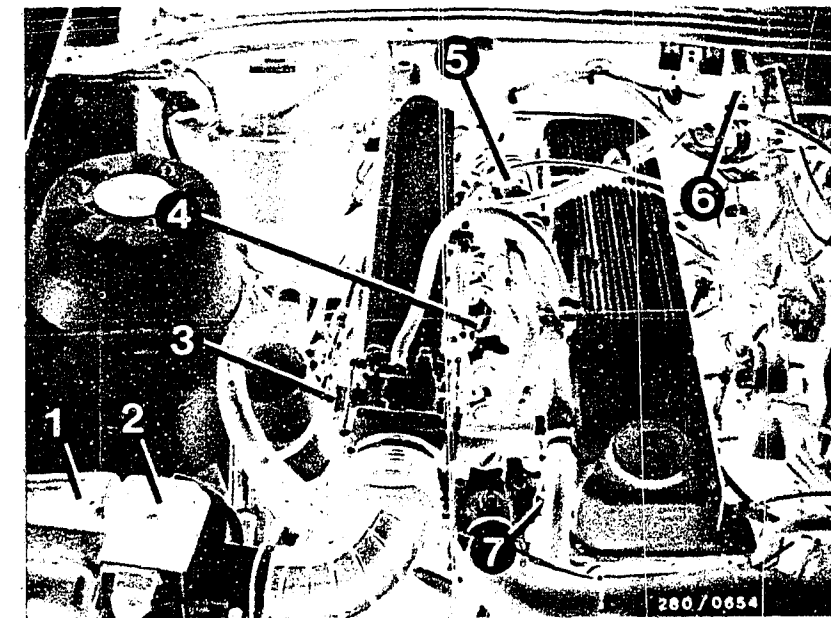
- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

• Leak test:

Seal off exhaust tail pipe.
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Pull off hose after auxiliary air device and, using compressed-air gun, blow air (0,3 bar gauge pressure) into the intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc. Bubbling or foaming indicates a leak.

Yes

Continued E13/E14



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor
(engine temperature
NTC II)

E11

Engine starts but then dies
Opel Senator, Monza 3.0 E



E12

Engine starts but then dies
Opel Senator, Monza 3.0 E



Engine starts but then dies (continued)

yes

Trouble-shooting program for
customer complaint

"Engine starts but then dies"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

E13

Engine starts but then dies

Opel Senator, Monza 3.0 E



E14

Engine starts but then dies

Opel Senator, Monza 3.0 E



UNEVEN IDLE, INCORRECT IDLE SPEED

Trouble-shooting program according to customer complaints

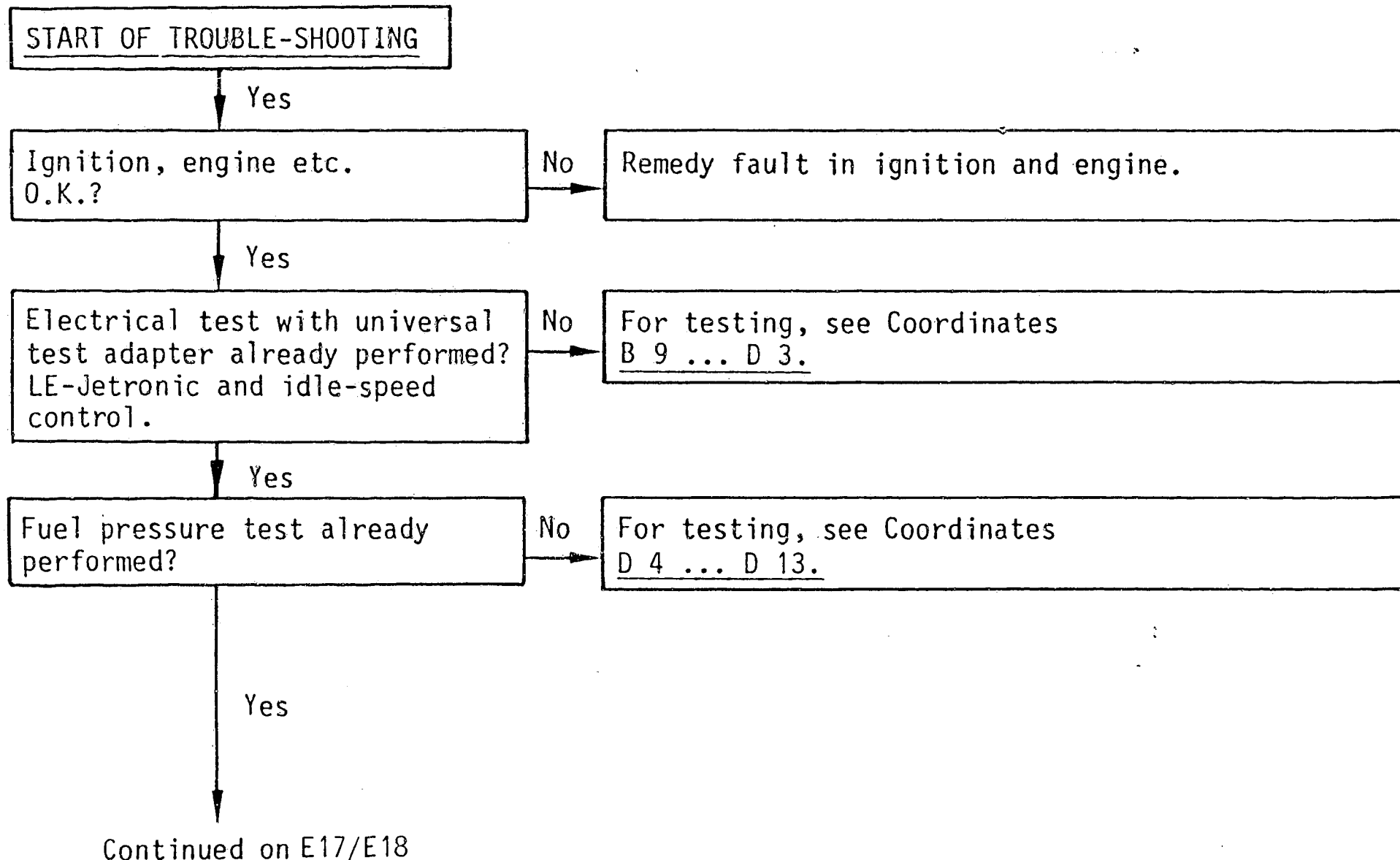
How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



E15

Uneven idle

Opel Senator, Monza 3.0 E



E16

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

Yes

Throttle valve closed?

- Throttle lever coming up against stop screw?
- Throttle cable free of tension?
- Throttle cable without kinks?

No

Testing:

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

- Adjusting the throttle valve:
Throttle valve must come up against the stop screw with the throttle lever just before it sticks. Lock stopscrew with lock nut.
- The throttle cable must be adjusted free of tension.
- If throttle cable kinked, replace.

Yes

Throttle-valve switch correctly adjusted?

- Idle contact closing?
- Microswitch can be heard to click?

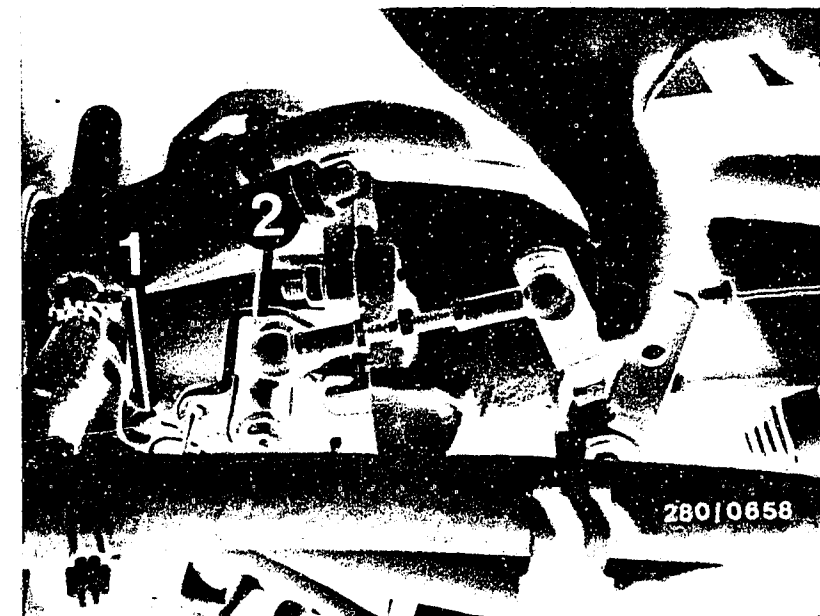
No

- Adjusting the throttle-valve switch
Slightly loosen the throttle-valve switch fastening screws. Connect ohmmeter to throttle-valve switch between term. 2 and lead 9 (term. 18). Turn throttle-valve switch in a counter-clockwise direction until the idle contact closes (microswitch can be heard to click).
Reading 0 Ω .

- Checking the adjustment:
Pull slightly on throttle cable. The idle contact opens (microswitch can be heard to click).
Reading $\infty \Omega$.

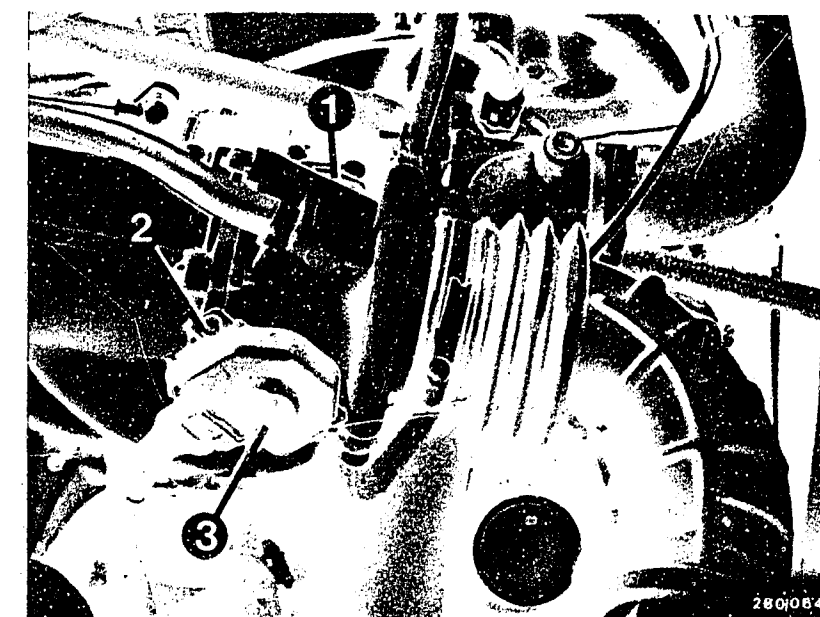
Yes

Continued on E19/E20



- 1 = Throttle-valve stop screw
- 2 = Throttle lever

- 1 = Throttle lever
- 2 = Fastening screws
- 3 = Throttle-valve switch



E17

Uneven idle

Opel Senator, Monza 3.0 E



E18

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

Yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:
775 ... 825 min⁻¹

Automatic transmission:
675 ... 725 min⁻¹

with on/off ratio:

30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission
(selector lever in position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

• CO concentration max.

0.5% by vol. CO

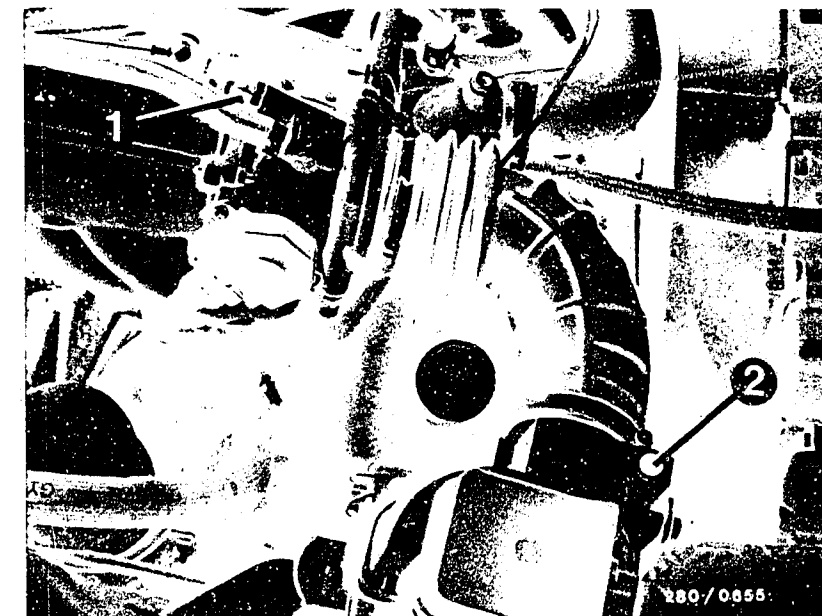
Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation. When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve. It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

Yes

Idle speed not adjustable.

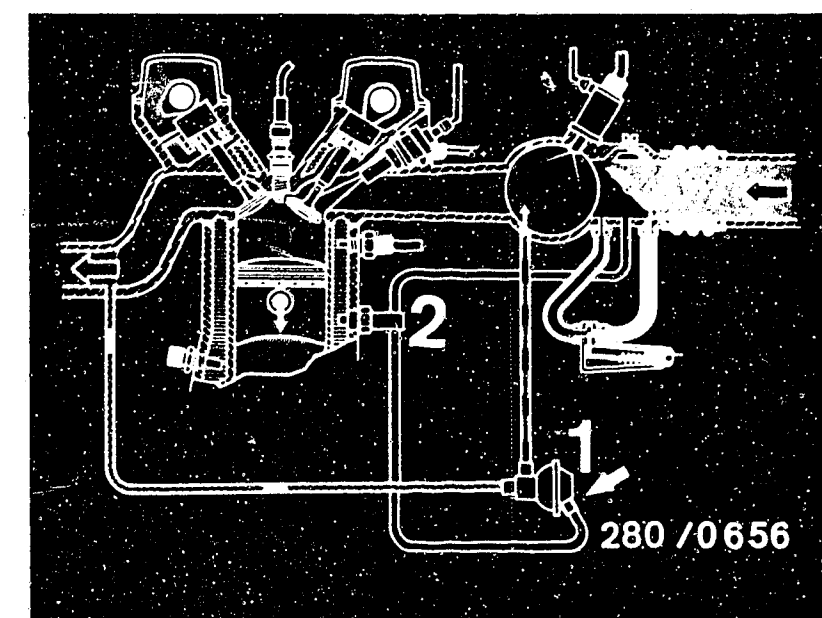
Yes

Continued on E21/E22



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



E19

Uneven idle

Opel Senator, Monza 3.0 E



E20

Uneven idle

Opel Senator, Monza 3.0 E



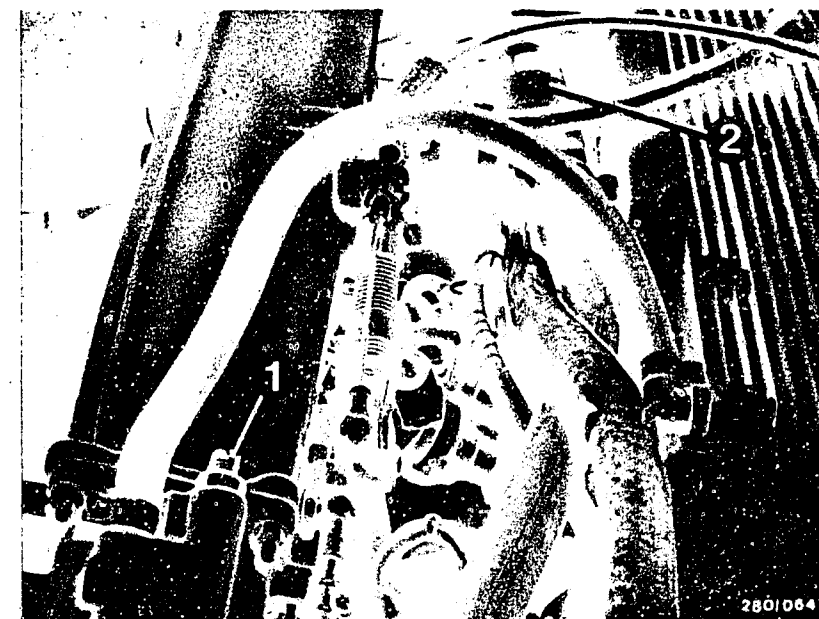
Uneven idle, incorrect idle speed (continued)

Yes

On all vehicles:

If CO concentration too high, turn CO adjusting screw in air-flow sensor half a turn in a counter-clockwise direction (hexagon-socket-head cap screw AF = 5 mm). Check idle speed and CO concentration again.

If necessary, make corrections in several steps. After adjusting, use new red plug (1 280 508 012).



1 = Idle-speed adjusting screw
2 = Idle actuator

Test idle actuator mechanically.

- Engine-speed drop when hose pinched off? (Engine cold)
- Does idle actuator vibrate with engine running?

no

Functional test of idle actuator

- With engine cold, pinch off hose to idle actuator. Engine speed must drop noticeably.
- Idle actuator must vibrate noticeably with the engine running.

If not, replace idle actuator.

Yes

Continued on E23/E24

E21

Uneven idle

Opel Senator, Monza 3.0 E



E22

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

yes

Injection valves checked for proper operation?

- Injection pulses without interference or missing?
- Lines correctly routed?
- No loose contacts in plug-in connections?

no

Connect the test lead as follows:

The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.

Caution!

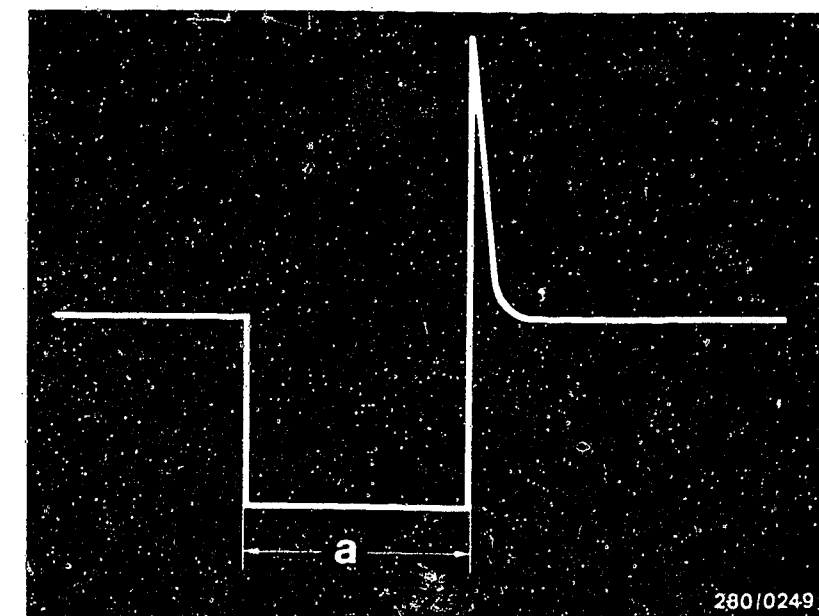
Free terminal must not come into contact with vehicle body.

When the correct terminal is connected, the diagram shown opposite is visible. Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running. If the diagram opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested. In case of interference - check routing of leads.

In case of missing, eliminate loose contacts in leads or in plug-in connections.

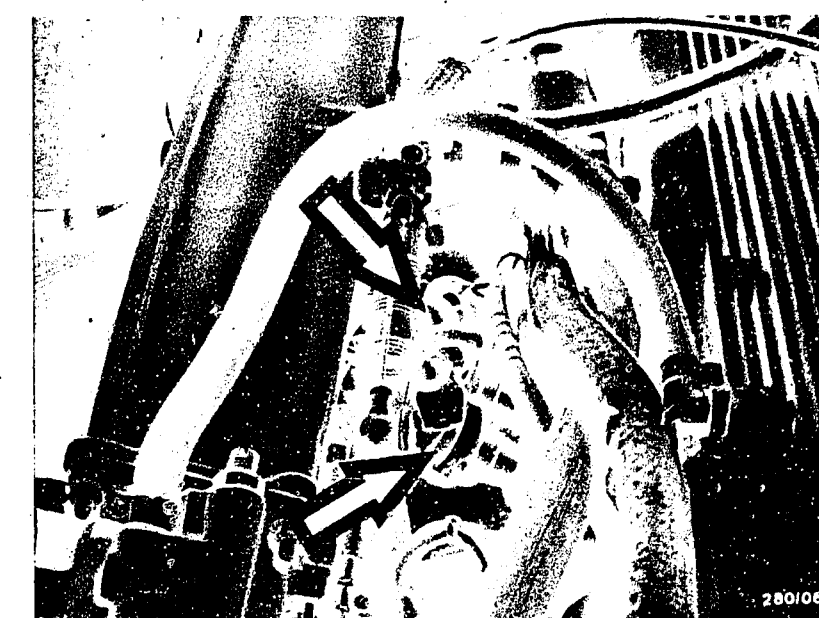
yes

Continued on F1/F2



Injection pulses of a switched output stage (measured at injection valve)
a = Pulse length (dependent on engine load)

Arrows = Injection valves



E23

Uneven idle

Opel Senator, Monza 3.0 E



E24

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

yes

Injection valve mechanically O.K.?

- Does engine speed drop when injection-valve connectors are pulled off individually?

no

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.. If replacing, install only injection valves 0 280 150 205.

Replacing the solenoid-operated injection valves

Pull off the electric terminal.

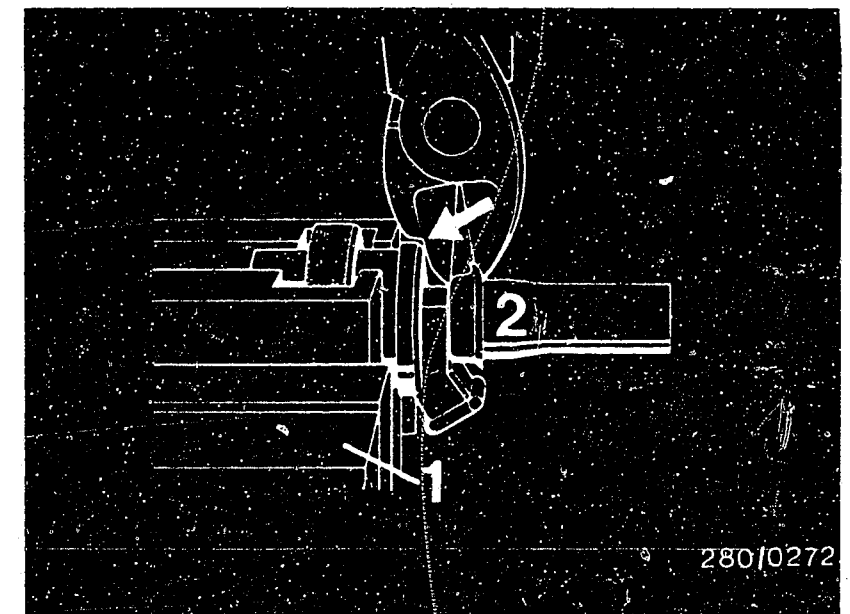
1. Removing the hose

- The fasteners on the injection valve (O-ring) need not be removed.
- Place injection valve in clamping fixture 1 688 120 093 and clamp in vise.
- Cut open hose-termination sleeve with side cutters and remove.
- Cut open the hose lengthways using a soldering iron or soldering gun and pull off.

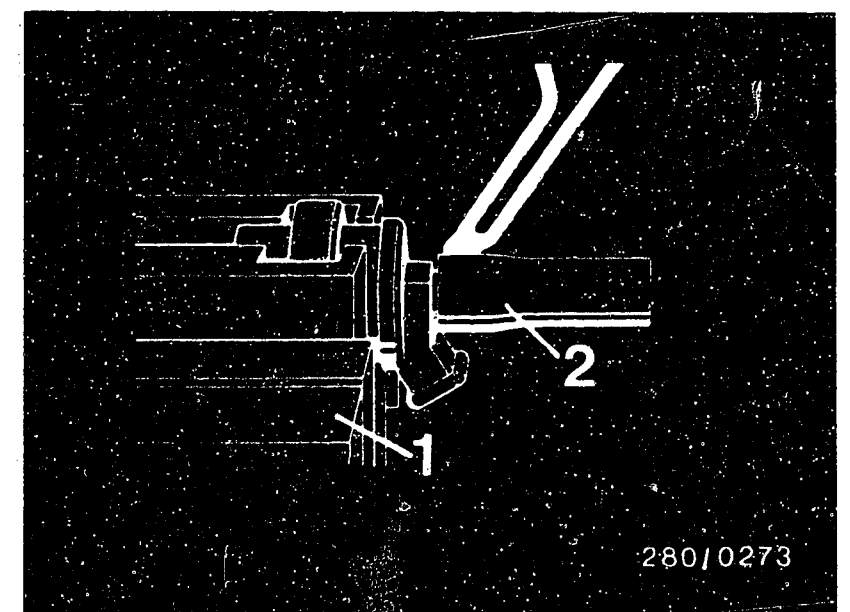
yes

yes

Continued on F3/F4



- 1 = Clamping fixture
(1 688 120 093)
2 = Solenoid-operated injection valve



F1

Uneven idle

Opel Senator, Monza 3.0 E



F2

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

Yes

2. Installing the hose

Parts set 1 287 010 701 is required for installation.

- Clean outside of tailpiece.
- Wet new fuel hose with fuel or calibrating oil.
- Press hose and hose-termination sleeve by hand as far as they will go onto the tailpiece using assembly mandrel 1 687 931 003. Hose-termination sleeve must then be tight.

Caution! Do not use hose clamp on tailpiece of injection valve.

Installing the injection valves and the intake manifold.

Make sure that the rubber seals on each injection valve are properly seated. Replace seals if defective. Press all 6 solenoid-operated injection valves with the fuel delivery line uniformly into their seats.

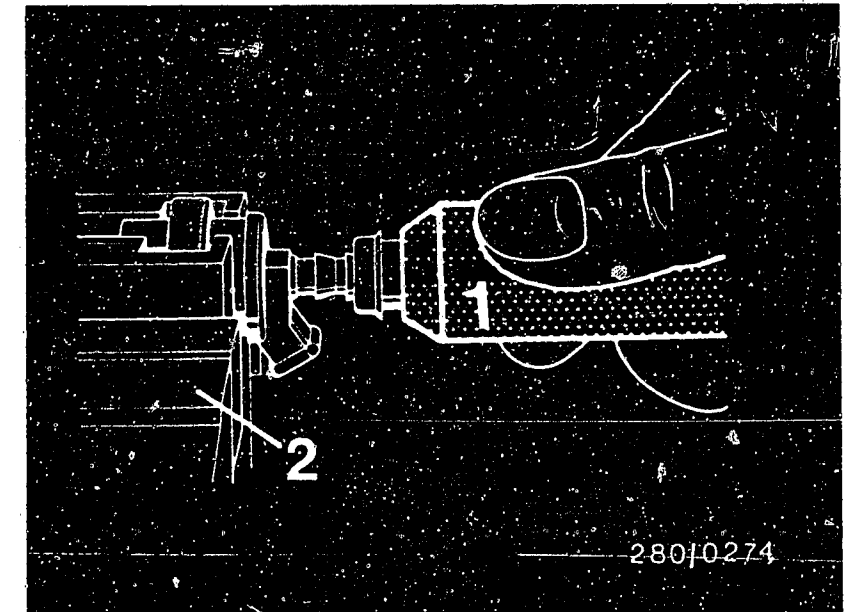
Important! All injection valves must have a tight fit.

Tighten central screws making sure that the fastening plate is in good contact with the injection valves.

Check all fuel and air hose connections once again to see if they are properly attached. Start the engine and check whether any unmetered air is being drawn in.

Yes

Continued on F5/F6



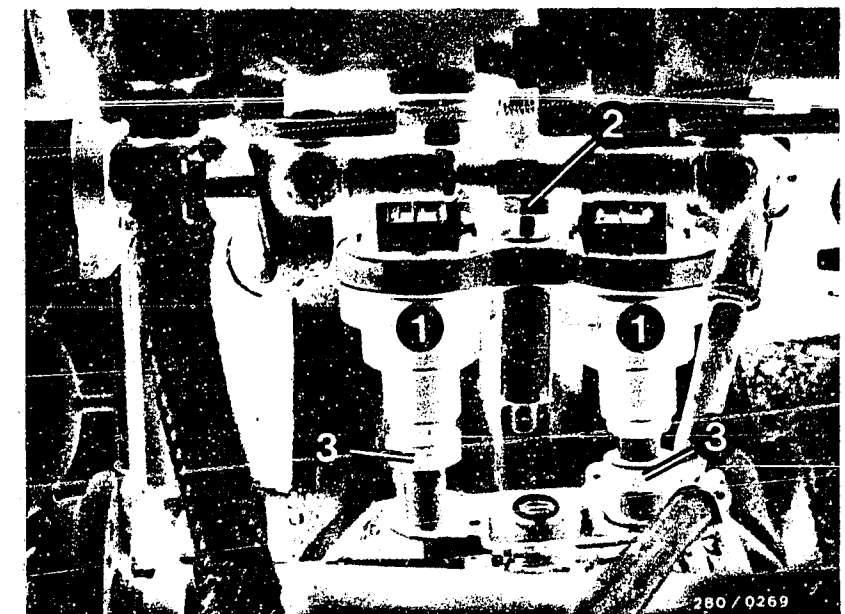
1 = Assembly mandrel
(1 687 931 003)

2 = Clamping fixture
(1 688 120 093)

1 = Solenoid-operated injection valve

2 = Central screw

3 = O-ring (rubber seal)



F3

Uneven idle

Opel Senator, Monza 3.0 E



F4

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):
60...1000 Ω

No

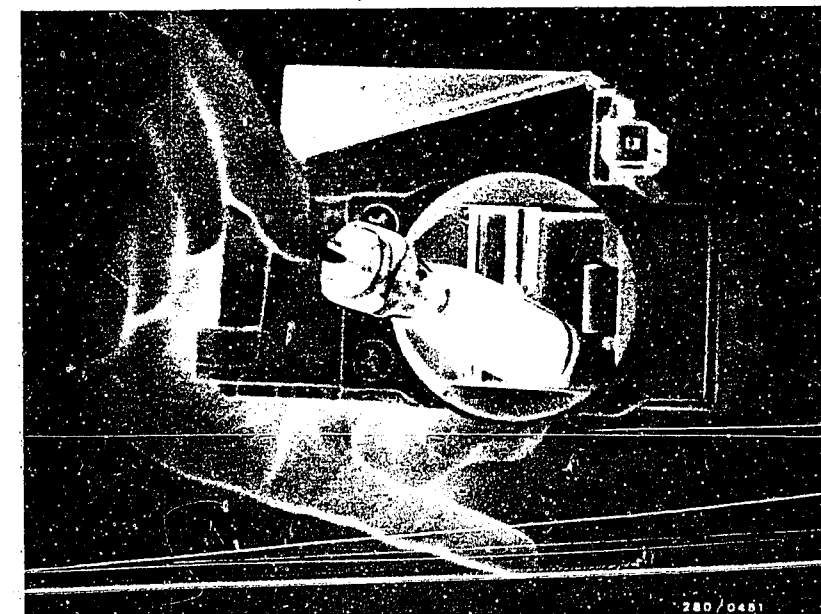
Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.
- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced.
- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.
Test specification: 160...300 Ω
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.
Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

Yes

Continued on F7/F8



Opening the air-flow sensor flap.

F5

Uneven idle

Opel Senator, Monza 3.0 E



F6

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

Yes

Check air-intake system for leaks.

- Are all hose lines correctly attached? (Visual examination).
- Hoses kinked or damaged?
- Air-intake system tested for leaks with 0.3 bar gauge pressure?

no

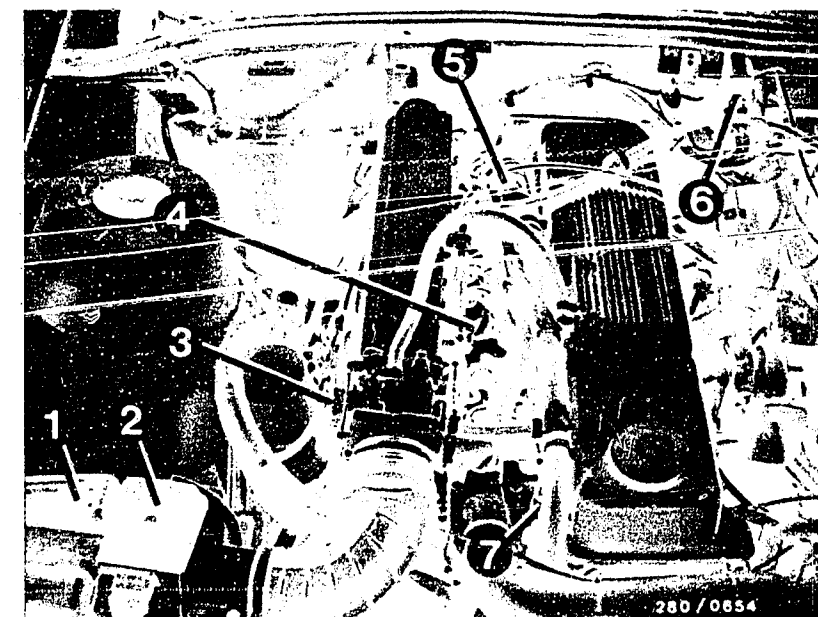
- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

• Leak test:

Seal off exhaust tail pipe. .
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Disconnect hose after idle actuator and blow air (0.3 bar gauge pressure) into the intake manifold with compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc. Bubbling or foaming indicates a leak.

Yes

Continued on F9/F10



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor (engine temperature NTC II)

F7

Uneven idle

Opel Senator, Monza 3.0 E



F8

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:
775 ... 825 min⁻¹

Automatic transmission:
675 ... 725 min⁻¹

with on/off ratio:
30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

Test specifications reached?

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission
(selector lever in position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

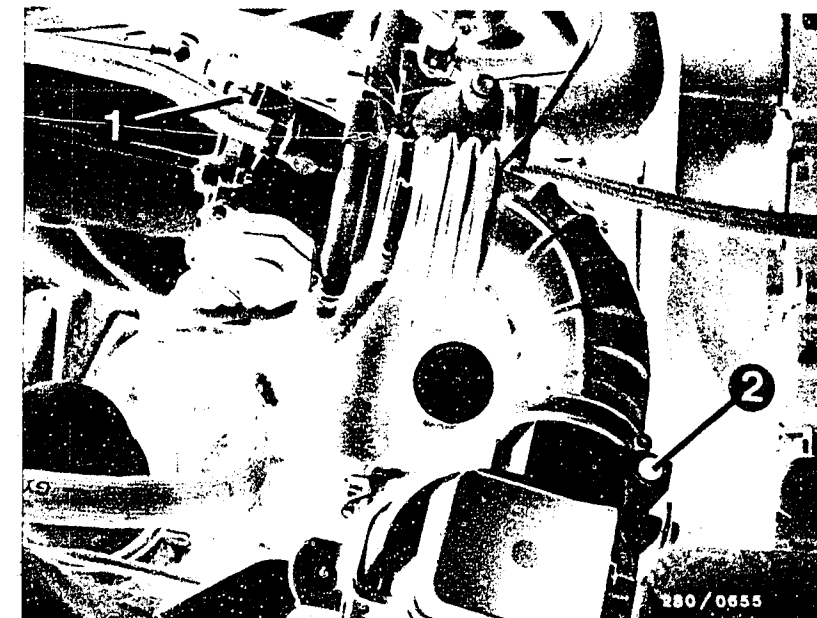
• CO concentration max.

0.5% by vol. CO

Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation. When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve. It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

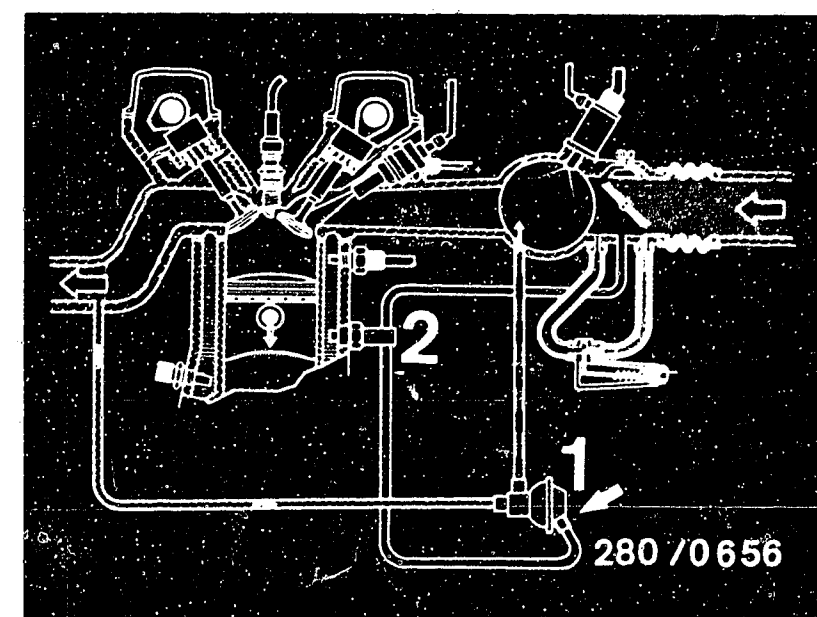
Yes

Continued on F11/F12



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



F9

Uneven idle

Opel Senator, Monza 3.0 E



F10

Uneven idle

Opel Senator, Monza 3.0 E



Uneven idle, incorrect idle speed (continued)

yes

For all vehicles:

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction (hexagon-socket-head cap screw AF 5). Test idle speed and CO concentration again. If necessary, make corrections in several steps. After adjusting, use new (red) plugs (1 280 508 012).

Trouble-shooting program for customer complaint

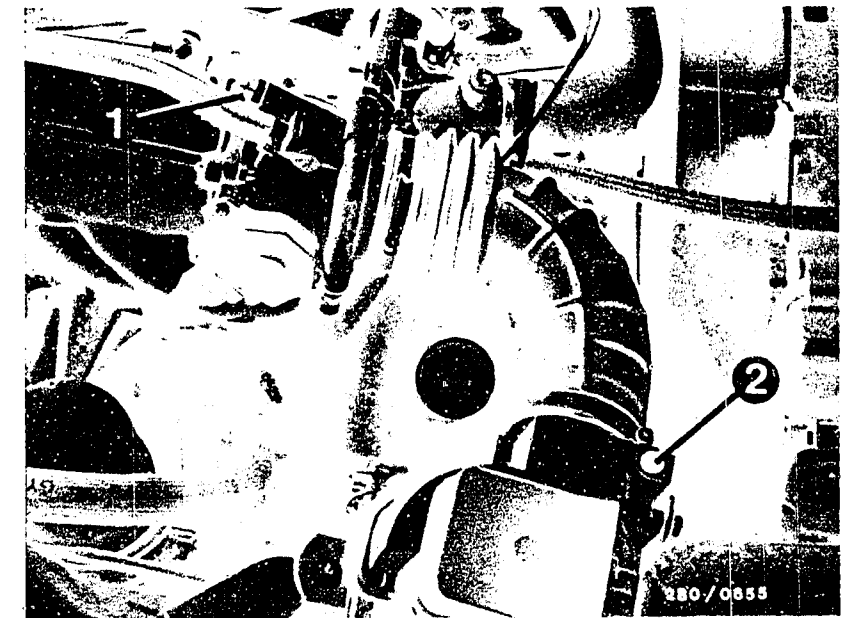
"Uneven idle, incorrect idle speed"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

F11

Uneven idle

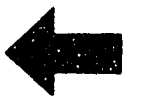
Opel Senator, Monza 3.0 E



F12

Uneven idle

Opel Senator, Monza 3.0 E



POOR THROTTLE TAKE-UP

Trouble-shooting program according to customer complaints

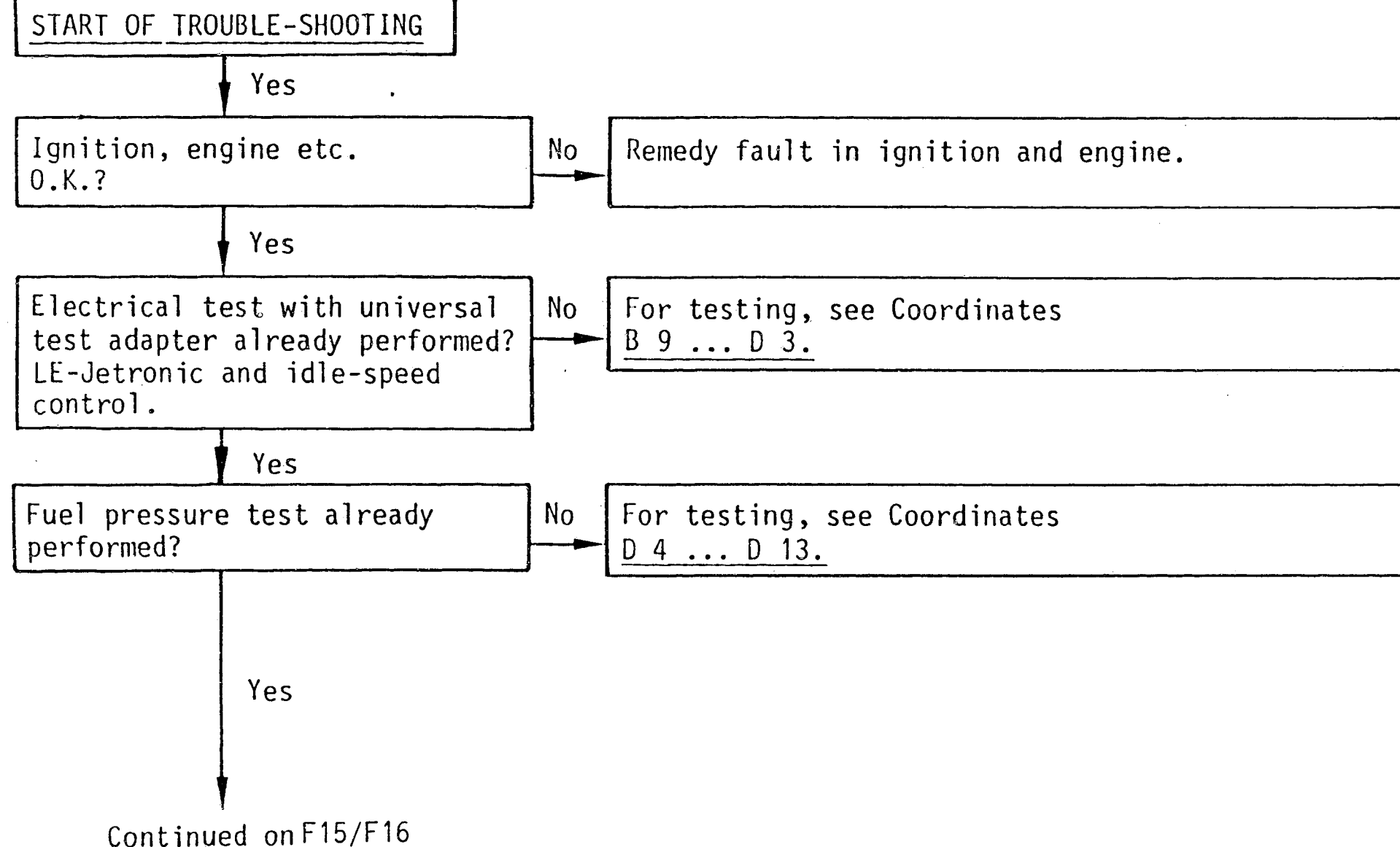
How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



F13

Poor throttle take-up
Opel Senator, Monza 3.0 E



F14

Poor throttle take-up
Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Throttle valve closed?

- Throttle lever coming up against stop screw?
- Throttle cable free of tension?
- Throttle cable without kinks?

No

Testing:

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

- Adjusting the throttle valve:

Throttle valve must come up against the stop screw with the throttle lever just before it sticks. Lock stopscrew with lock nut.

- The throttle cable must be adjusted free of tension.
- If throttle cable kinked, replace.

Yes

Throttle-valve switch correctly adjusted?

- Idle contact closing?
- Microswitch can be heard to click?

No

- Adjusting the throttle-valve switch

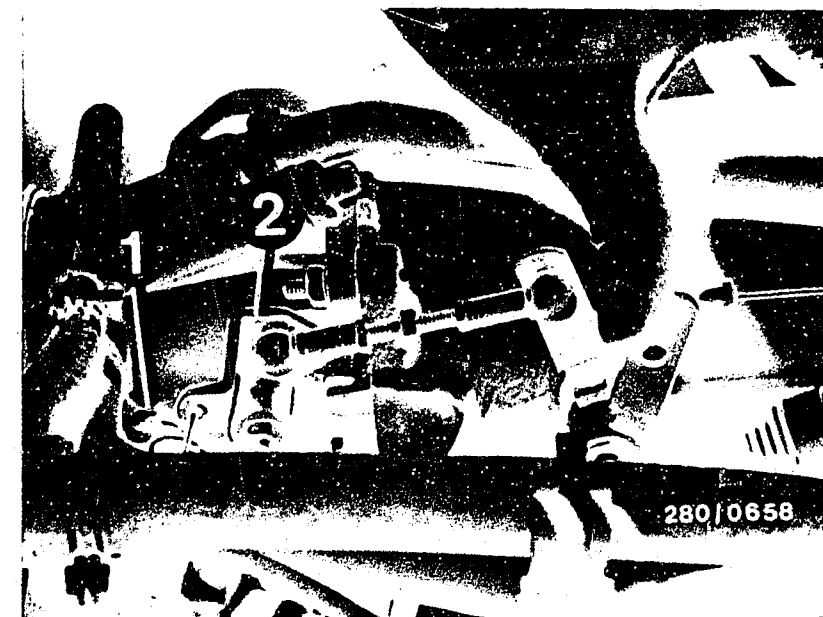
Slightly loosen the throttle-valve switch fastening screws. Connect ohmmeter to throttle-valve switch between term. 2 and lead 9 (term. 18). Turn throttle-valve switch in a counter-clockwise direction until the idle contact closes (microswitch can be heard to click). Reading 0 Ω .

- Checking the adjustment:

Pull slightly on throttle cable. The idle contact opens (microswitch can be heard to click). Reading $\infty \Omega$.

Yes

Continued on F17/F18



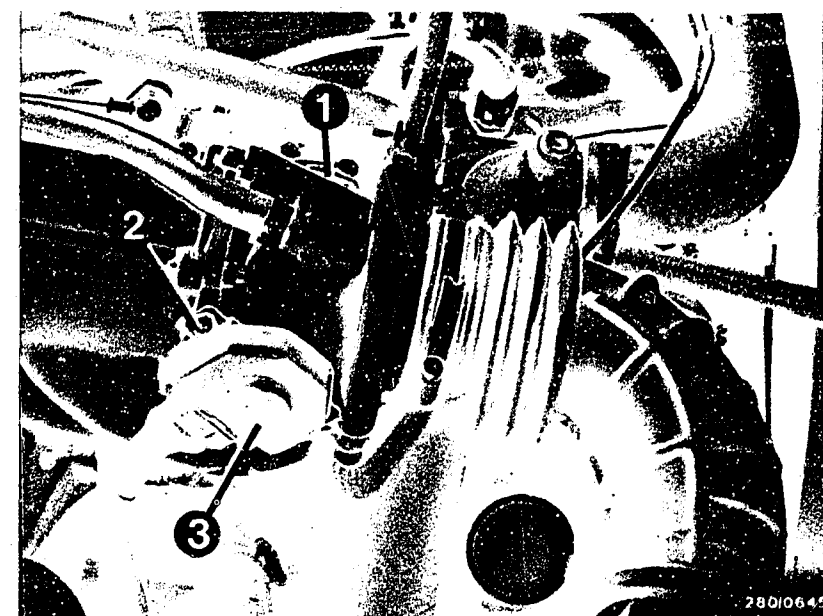
1 = Throttle-valve stop screw

2 = Throttle lever

1 = Throttle lever

2 = Fastening screws

3 = Throttle-valve switch



F15

Poor throttle take-up

Opel Senator, Monza 3.0 E



F16

Poor throttle take-up

Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Test idle actuator mechanically.

- Engine-speed drop when hose pinched off?
(Engine cold)
- Does idle actuator vibrate with engine running?

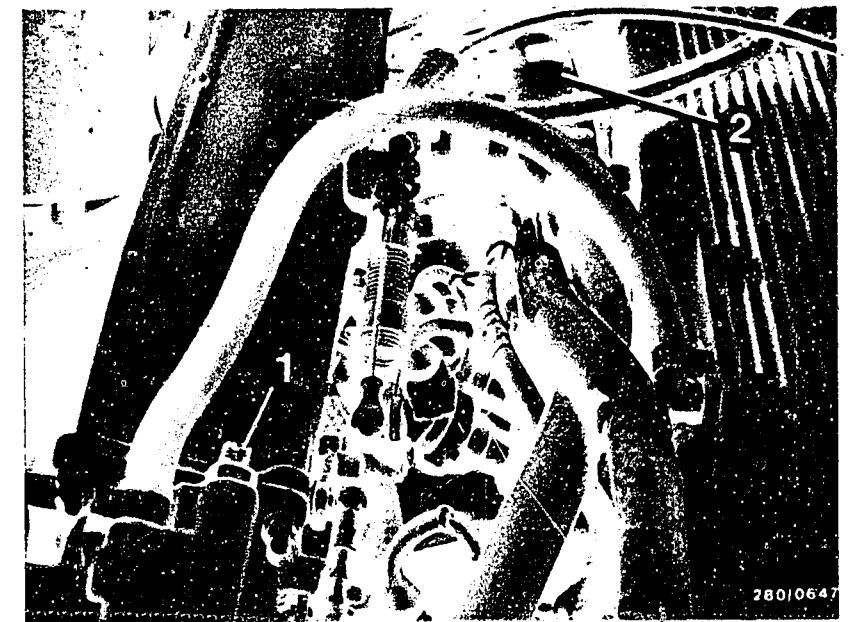
no

Functional test of idle actuator

- With engine cold, pinch off hose to idle actuator.
Engine speed must drop noticeably.
- Idle actuator must vibrate noticeably with the engine running.
If not, replace idle actuator.

Yes

Continued on F19/F20



1 = Idle-speed adjusting screw
2 = Idle actuator

F17

Poor throttle take-up
Opel Senator, Monza 3.0 E



F18

Poor throttle take-up
Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):
60...1000 Ω

No

Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.

- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent.

The air-flow sensor must be replaced.

- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

Test specification: 160...300 Ω

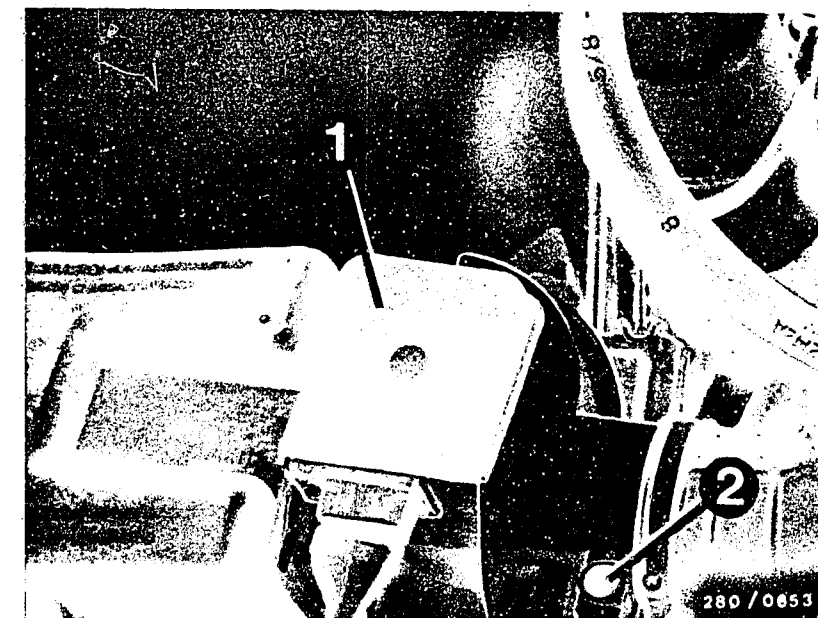
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.

Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

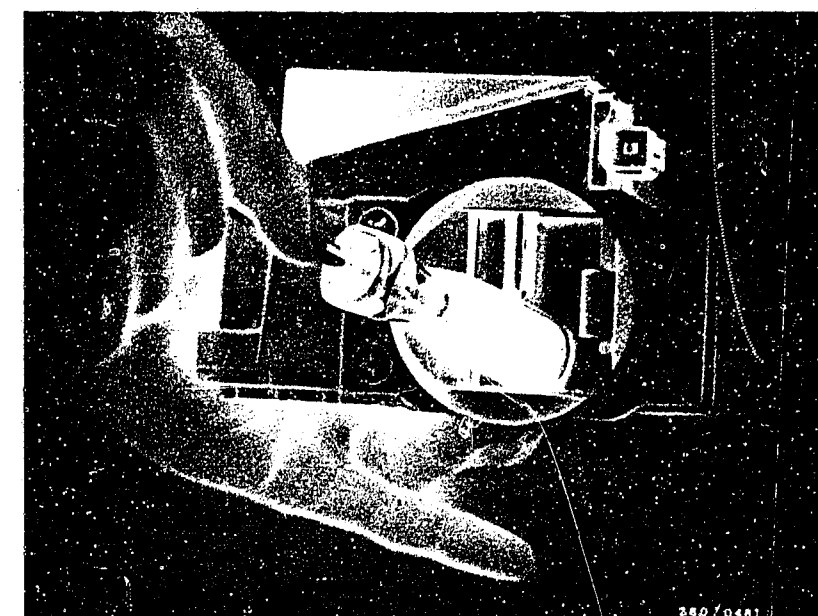
Yes

Continued F21/F22



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



F19

Poor throttle take-up

Opel Senator, Monza 3.0 E



F20

Poor throttle take-up

Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Air-flow sensor potentiometer
O.K.?

- Potentiometer wiper track
O.K.?

No

Potentiometer test: (noise test)

- Unscrew air-flow sensor from air filter housing and loosen hose clamp. Leave plug on. Set motortester to special input and, using the special cable, connect to air-flow sensor term.7 (red clip) and term. 5 (black clip).

- Making up the adapter lead:
User fabrication: two approx. 1 m long leads approx. 1.0 mm² cross section. On one end, 2 test prods are attached, and at the other end strip off approx. 2 cm of insulation and connect to the clamps of the special input connecting cable.

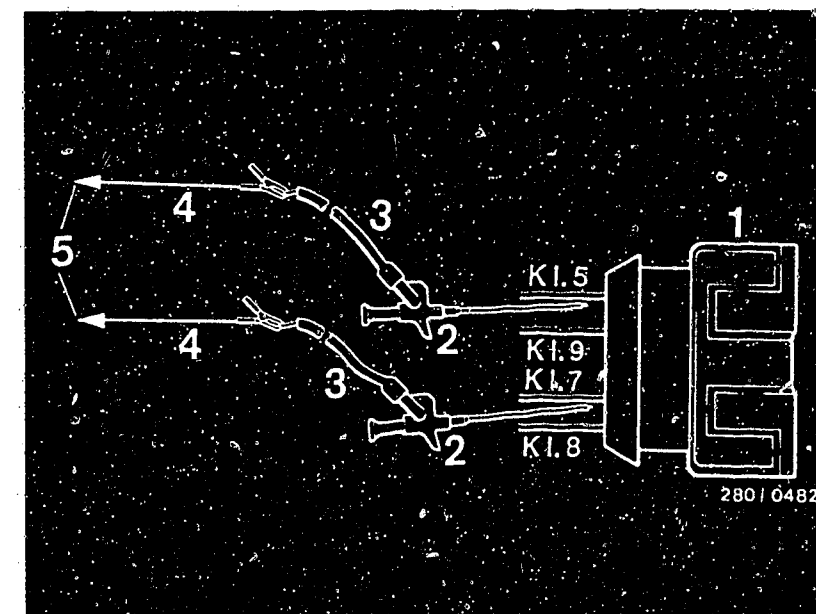
Caution!

Insulate bare connecting points of adapter lead (danger of short circuit). Measure carefully into the plug of the air-flow sensor. Do not bend any contact springs. Set control lever for image adjustment on motortester all the way to the left (calibrated setting).

- Disconnect control relay. Insert jumper between term. 87 and term. 30 in connection base. (Power supply through control unit).

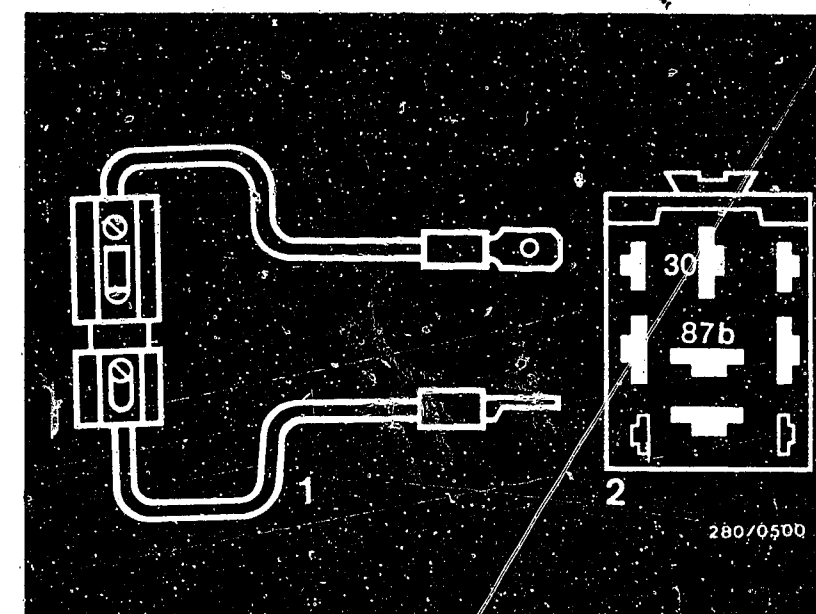
Yes

Continued on F 23/F24



- 1 = Air-flow sensor plug
- 2 = Test prod
- 3 = Adapter lead (user-fabricated)
- 4 = Special input connecting cable
- 5 = Motortester special input

- 1 = Jumper with fuse holder
- 2 = Top view of connection base



F21

Poor throttle take-up
Opel Senator, Monza 3.0 E



F22

Poor throttle take-up
Opel Senator, Monza 3.0 E



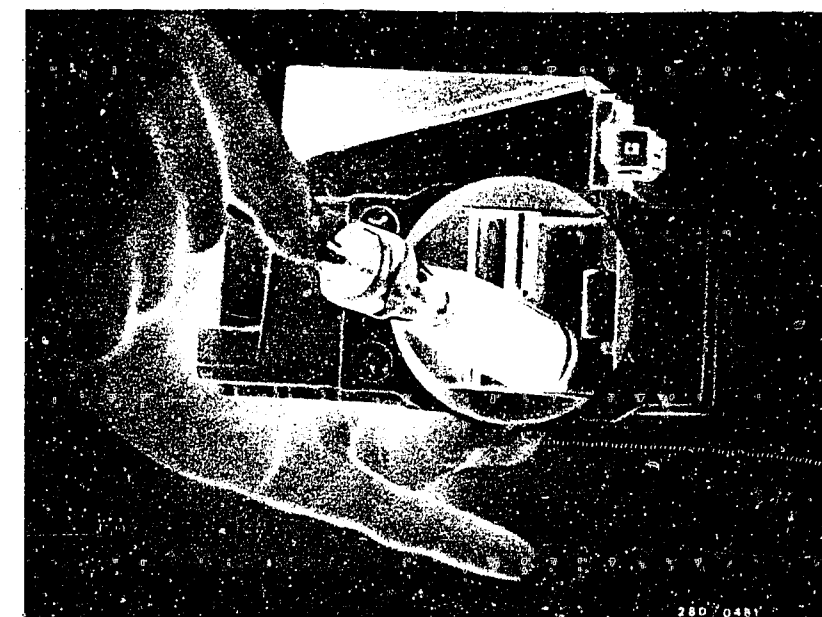
Poor throttle take-up (continued)

- Deflect air-flow sensor flap suddenly several times. If air-flow sensor O.K., a continuous signal must be visible on the oscilloscope. If air-flow sensor defective, there appears a noise signal similar to the one in the diagram opposite. Replace air-flow sensor. Disconnect adapter lead after testing and push on rubber sleeve properly. Mount air-flow sensor. Connect all hoses and tighten (leaks).

Caution! After testing, remove the jumper and connect the control relay.

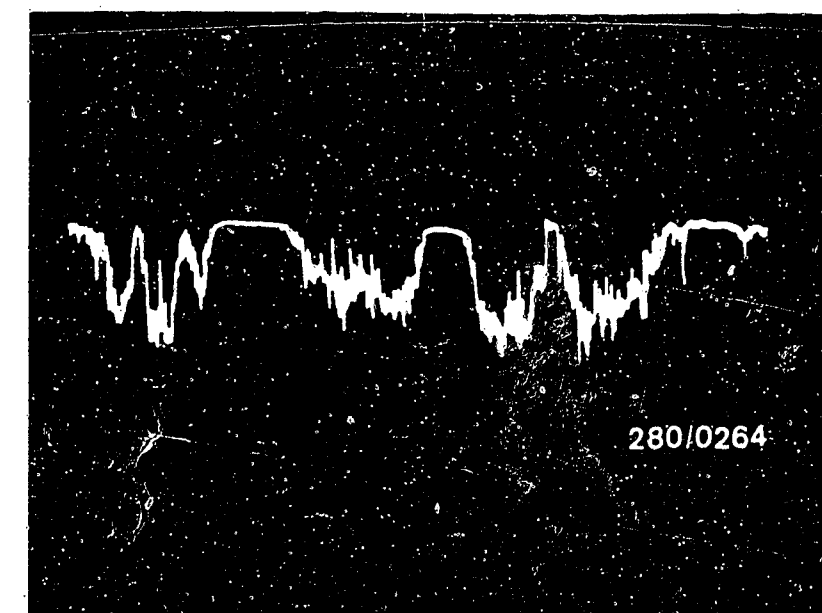
Yes

Continued on G1/G2



Opening the air-flow sensor flap.

Noise signal if air-flow sensor defective.



F23

Poor throttle take-up
Opel Senator, Monza 3.0 E



F24

Poor throttle take-up
Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Check air-intake system for leaks.

- Are all hose lines correctly attached.
(Visual examination.)
- Hoses kinked or damaged?
- Air-intake system tested for leaks with 0.3 bar gauge pressure.

no

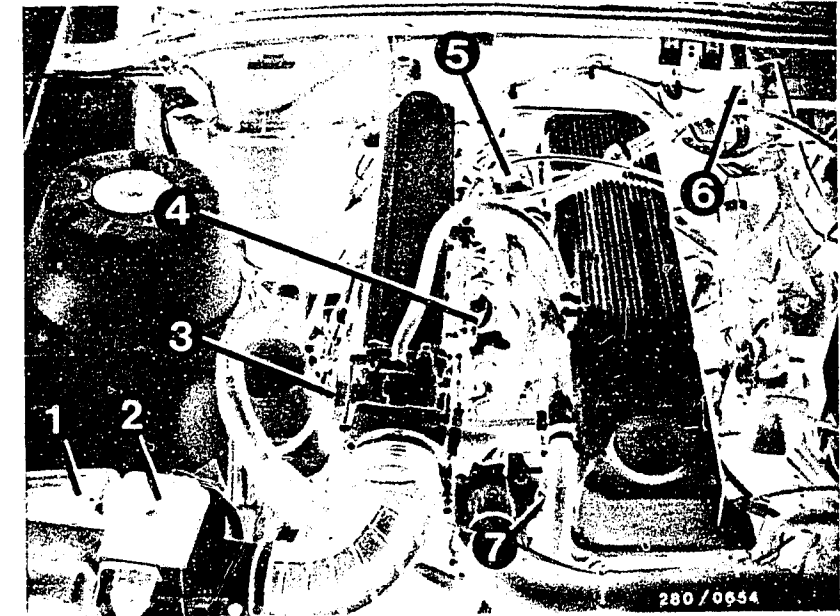
- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

Leak test:

Seal off exhaust tail pipe.
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Pull off hose after auxiliary air device and, using compressed-air gun, blow air (0,3 bar gauge pressure) into the intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc. Bubbling or foaming indicates a leak.

Yes

Continued on G3/G4



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor
(engine temperature
NTC II)

G1

Poor throttle take-up
Opel Senator, Monza 3.0 E



G2

Poor throttle take-up
Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

Yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:
775 ... 825 min⁻¹

Automatic transmission:
675 ... 725 min⁻¹

with on/off ratio:

30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

Test specifications reached?

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission
(selector lever in
position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

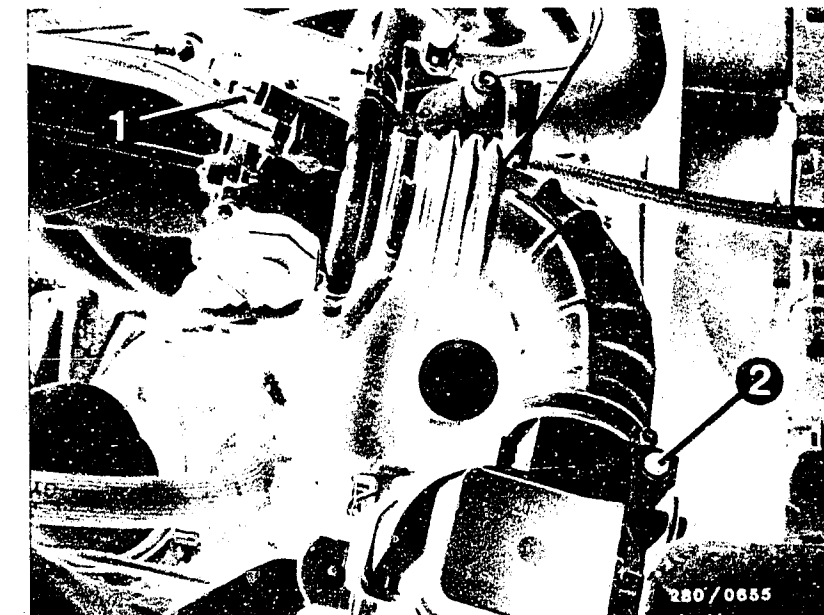
• CO concentration max.

0.5% by vol. CO

Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation. When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve. It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

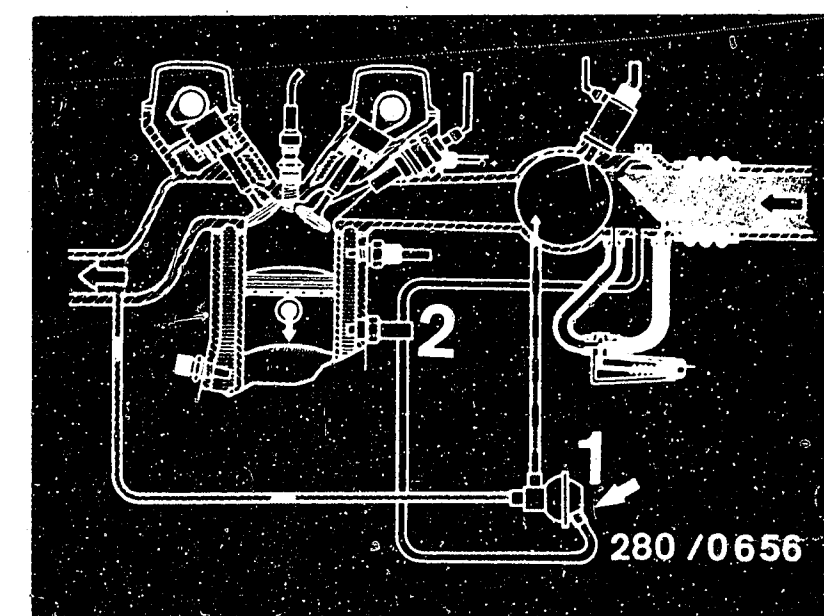
Yes

Continued on E21/E22



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



G3

Poor throttle take-up

Opel Senator, Monza 3.0 E



G4

Poor throttle take-up

Opel Senator, Monza 3.0 E



Poor throttle take-up (continued)

yes

For all vehicles:

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction (hexagon-socket-head cap screw AF 5). Test idle speed and CO concentration again. If necessary, make corrections in several steps. After adjusting, use new (red) plugs (1 280 508 012).

Trouble-shooting program for customer complaint

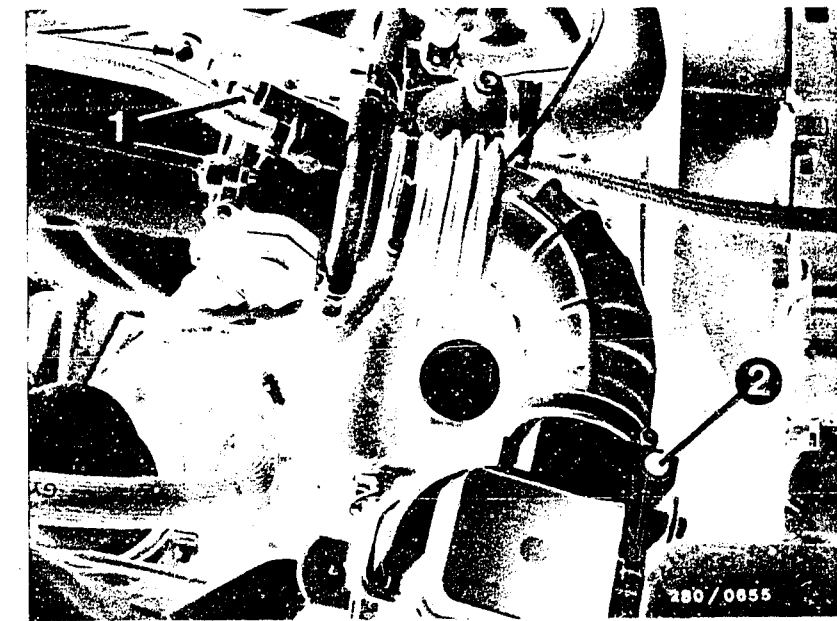
"Poor throttle take-up"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

G5

Poor throttle take-up
Opel Senator, Monza 3.0 E



G6

Poor throttle take-up
Opel Senator, Monza 3.0 E



ENGINE MISSING UNDER ALL OPERATING CONDITIONS

Trouble-shooting program according to customer complaints

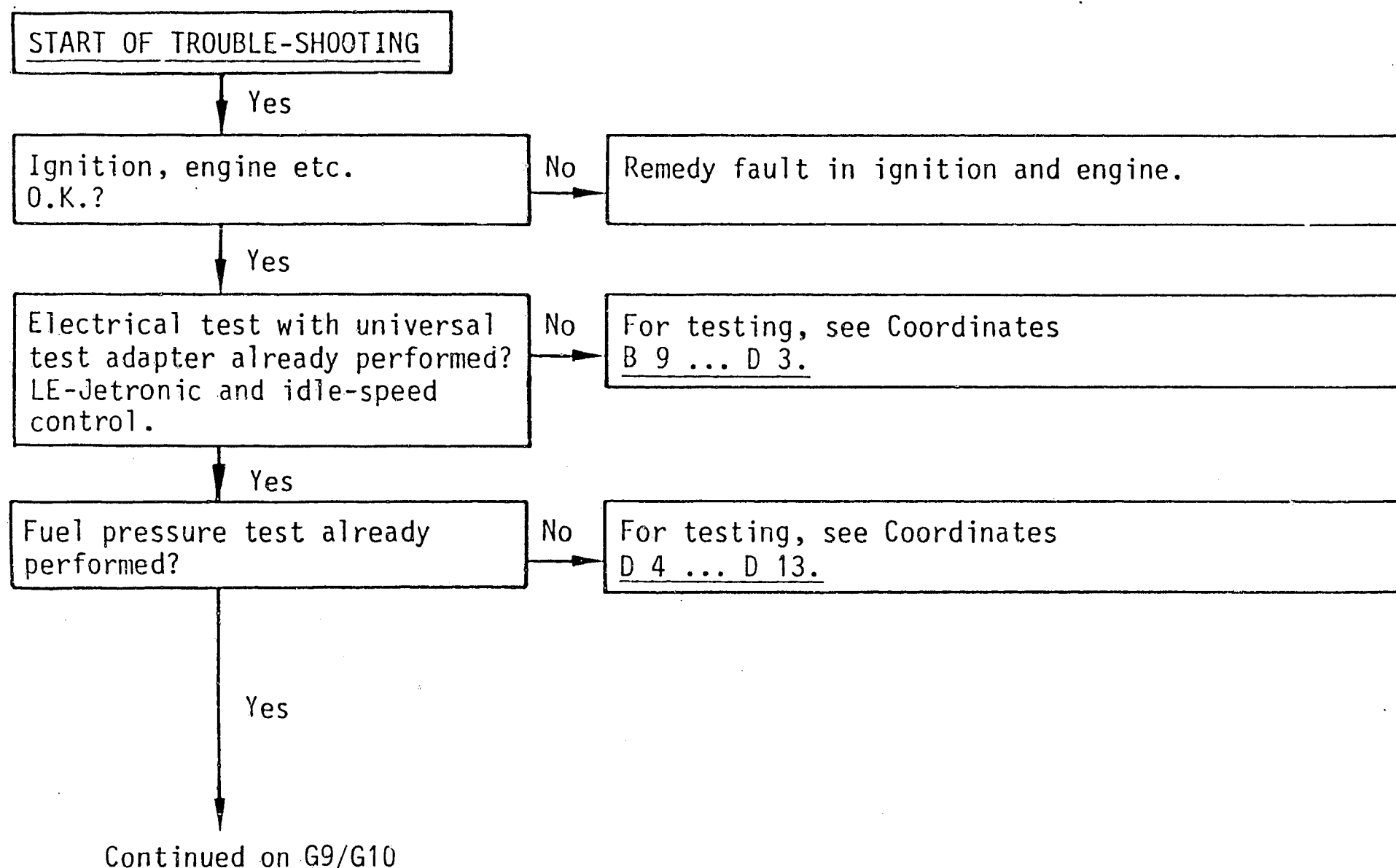
How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



G7

Engine missing
Opel Senator, Monza 3.0 E



G8

Engine missing
Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

yes

Generator with regulator O.K.?
(Engine missing due to voltage peaks).

no

With the engine switched off, remove the plug from the generator. Start the engine. If missing stops test generator and regulator. Voltage peaks are visible on the ignition oscilloscope.

yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):
60...1000 Ω

No

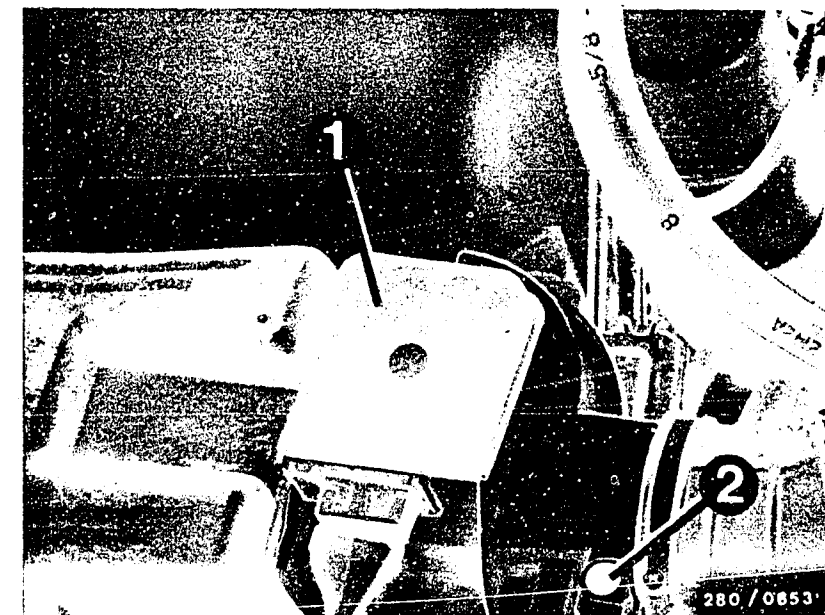
Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.
- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced.
- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.
Test specification: 160...300 Ω
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.
Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

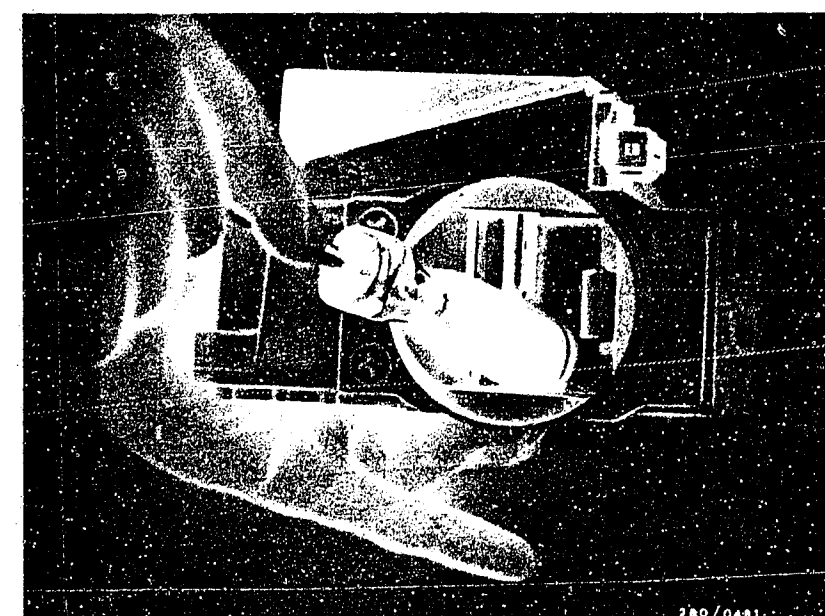
yes

Continued on G11/G12



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



G9

Engine missing

Opel Senator, Monza 3.0 E



G10

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

Yes

Air-flow sensor potentiometer O.K.?

- Potentiometer wiper track O.K.?

No

Potentiometer test: (noise test)

- Unscrew air-flow sensor from air filter housing and loosen hose clamp. Leave plug on. Set motortester to special input and, using the special cable, connect to air-flow sensor term. 7 (red clip) and term. 5 (black clip).

- Making up the adapter lead:
User fabrication: two approx. 1 m long leads approx. 1.0 mm² cross section. On one end, 2 test prods are attached, and at the other end strip off approx. 2 cm of insulation and connect to the clamps of the special input connecting cable.

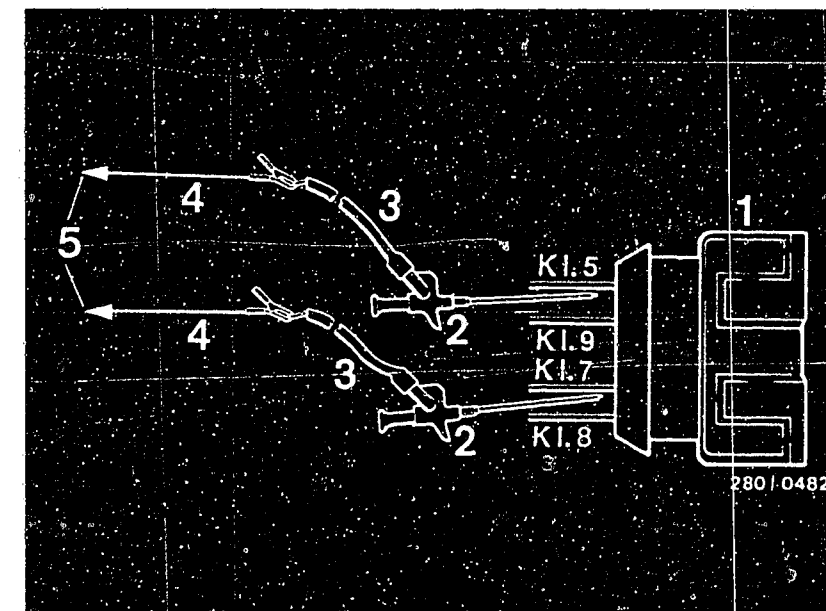
Caution!

Insulate bare connecting points of adapter lead (danger of short circuit). Measure carefully into the plug of the air-flow sensor. Do not bend any contact springs. Set control lever for image adjustment on motortester all the way to the left (calibrated setting).

- Disconnect control relay. Insert jumper between term. 87 and term. 30 in connection base. (Power supply through control unit).

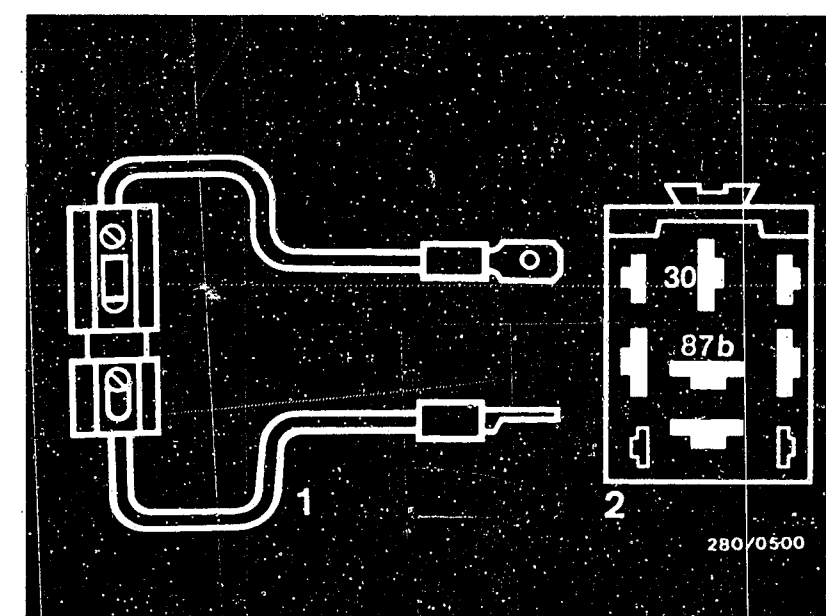
Yes

Continued on G13/G14



- 1 = Air-flow sensor plug
- 2 = Test prod
- 3 = Adapter lead (user-fabricated)
- 4 = Special input connecting cable
- 5 = Motortester special input

- 1 = Jumper with fuse holder
- 2 = Top view of connection base



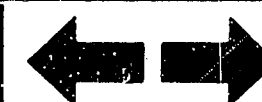
G11

Engine missing
Opel Senator, Monza 3.0 E



G12

Engine missing
Opel Senator, Monza 3.0 E

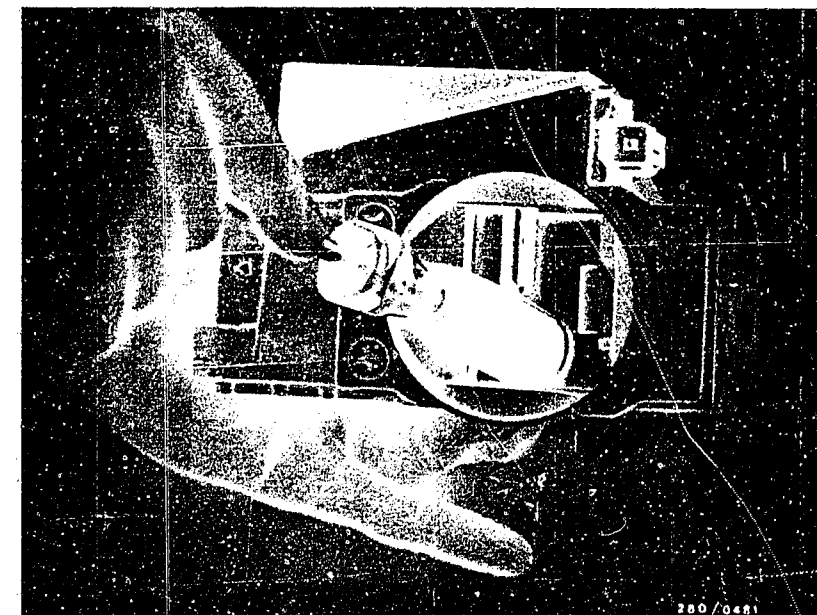


Engine missing under all operating conditions (continued)

- Deflect air-flow sensor flap suddenly several times. If air-flow sensor O.K., a continuous signal must be visible on the oscilloscope. If air-flow sensor defective, there appears a noise signal similar to the one in the diagram opposite. Replace air-flow sensor. Disconnect adapter lead after testing and push on rubber sleeve properly. Mount air-flow sensor. Connect all hoses and tighten (leaks).

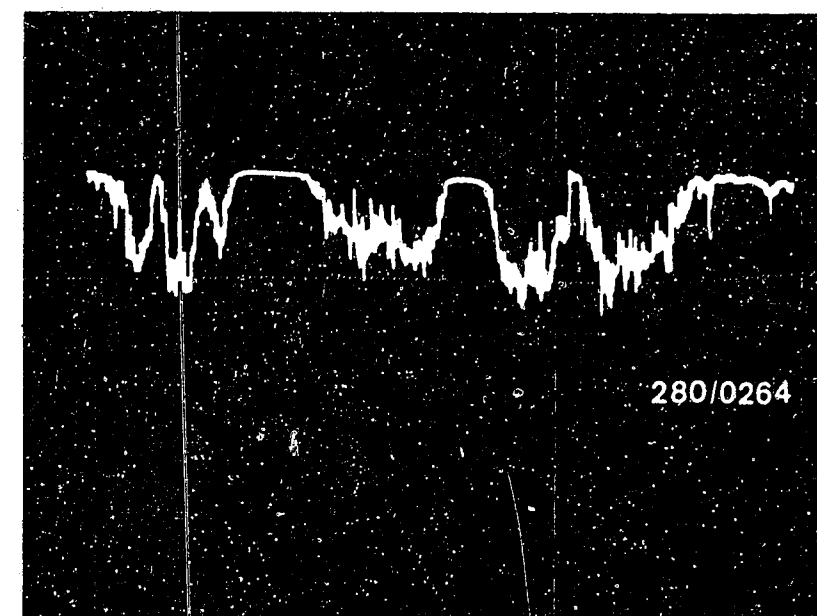
Caution! After testing, remove the jumper and connect the control relay.

Yes



Opening the air-flow sensor flap.

Noise signal if air-flow sensor defective.



Continued on G15/G16

G 13

Engine missing

Opel Senator, Monza 3.0 E



G 14

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

Yes

Delivery of electric fuel pump
O.K.?

Test specification:
min. 850 cm³/30 s

No

- Measuring the fuel delivery:
For testing, undo junction between fuel return hose (from pressure regulator) and fuel return line (to fuel tank).
If necessary, extend hose and lead into a 5 l vessel with graduated scale.
Disconnect control relay. Insert jumper between term. 87b and term. 30 in connection base.
Electric fuel pump must operate.
Test specification:
at least: 850 cm³/30 s

Caution!

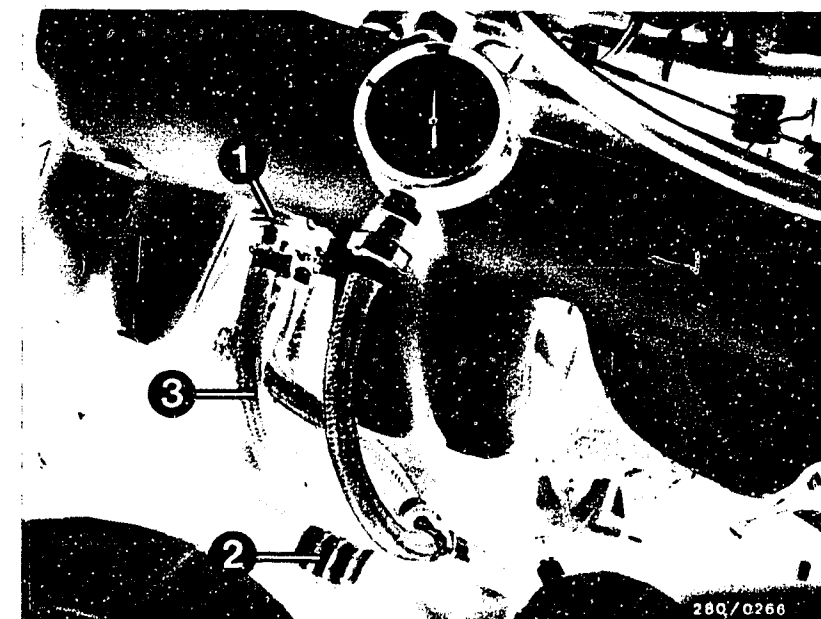
Jumper must be removed again after testing is completed.

Remedy if test specification not reached:

- Fuel filter clogged - replace.
- Voltage across terminals of electric fuel pump with engine running: min. 12 V. If not, clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective - replace.
- If delivery too low, replace electric fuel pump.

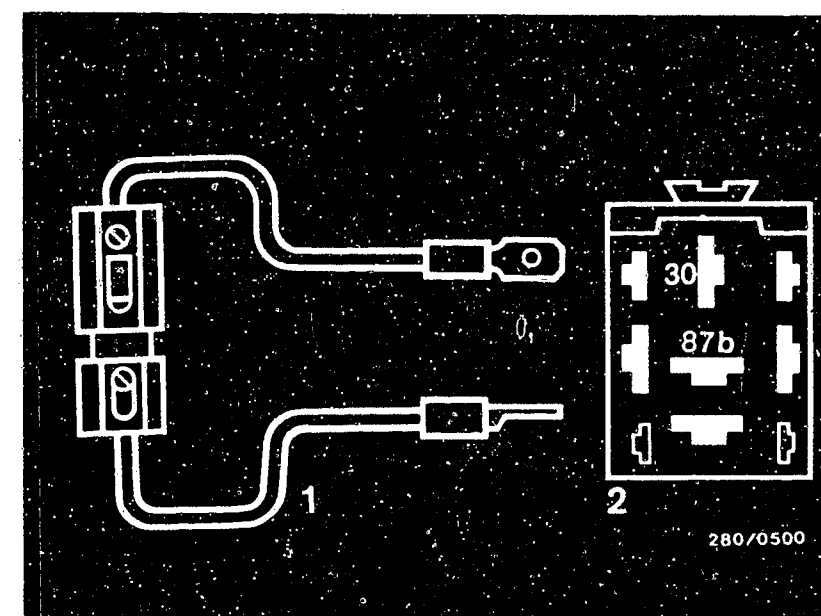
Yes

Continued on G17/G18



- 1 = Pressure regulator
- 2 = Fuel return line
- 3 = Fuel return hose

- 1 = Jumper with fuse holder and 10A fuse (user-fabricated)
- 2 = Top view of connection base



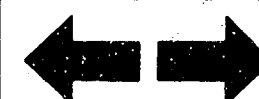
G15

Engine missing
Opel Senator, Monza 3.0 E

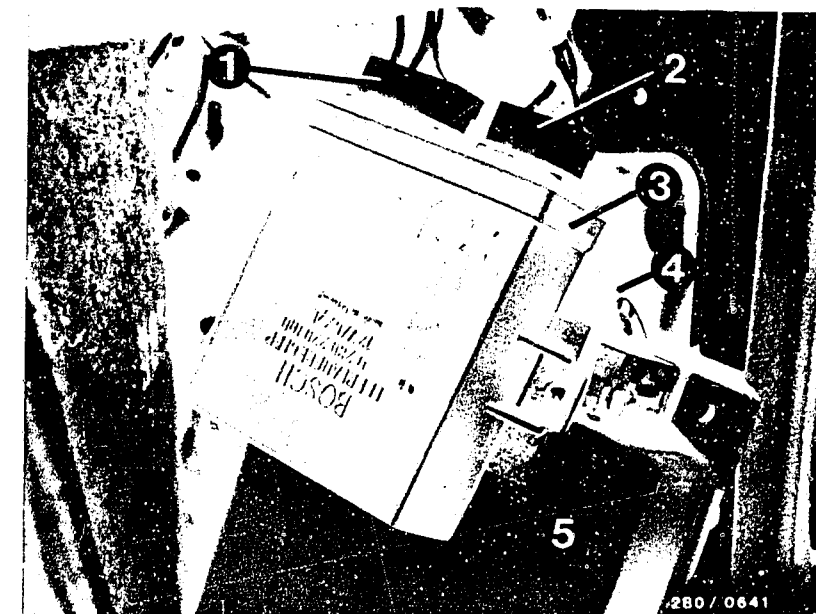
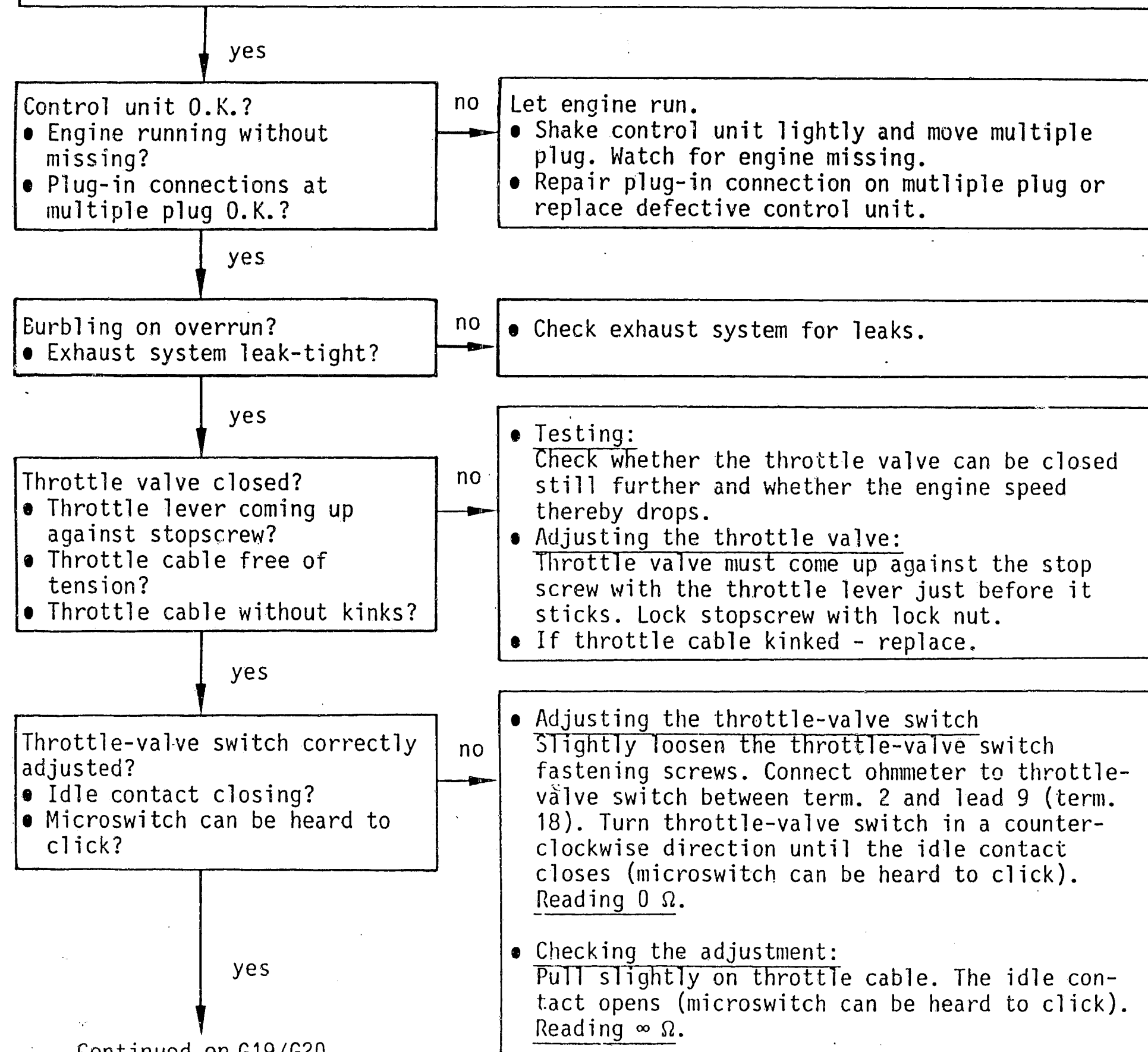


G16

Engine missing
Opel Senator, Monza 3.0 E



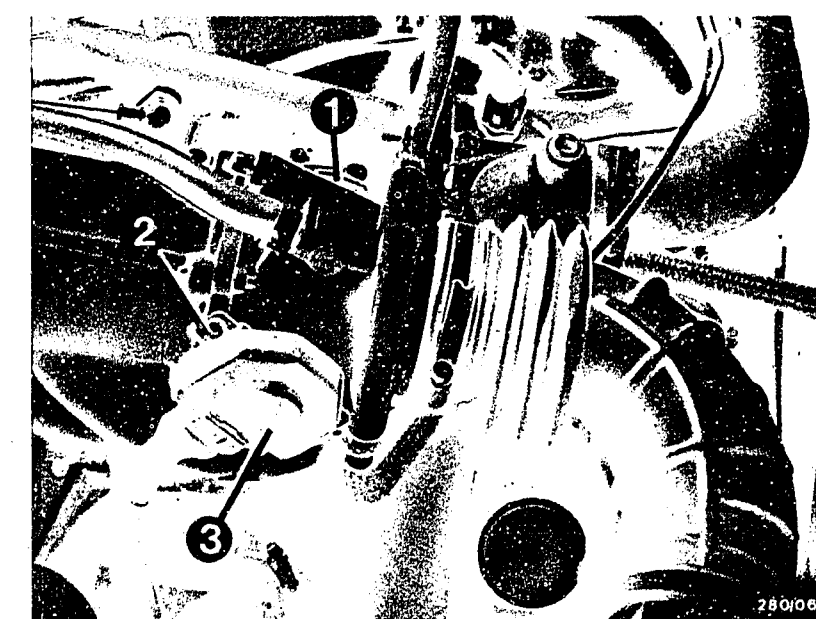
Engine missing under all operating operations (continued)



Idle-speed control

- 1 = 8-pin plug
- 2 = 6-pin plug
- 3 = Idle controller (controller unit) LE-Jetronic
- 4 = 25-pin control-unit plug
- 5 = Control unit

- 1 = Throttle lever
- 2 = Fastening screws
- 3 = Throttle-valve switch



G17

Engine missing

Opel Senator, Monza 3.0 E



G18

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

yes

Burbling on overrun?

- Overrun cutoff O.K.?
- Operation of control unit O.K.?
- Reinstatement speed O.K.?

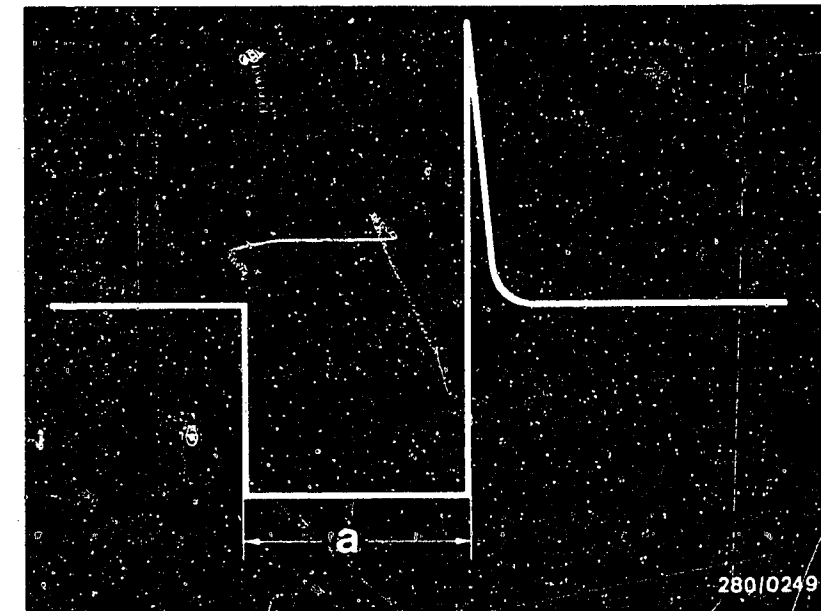
cold: 2400 min⁻¹
warm: 1650 min⁻¹

no

- Testing the overrun cutoff
Connect test lead as follows: The two-pole connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two connection clamps of the test lead, only one clamp must be connected to the special input of the motortester. When the correct clamp is connected, the graph shown opposite is visible on the oscilloscope. Observe oscilloscope.
- Slowly raise engine speed to 3000 min⁻¹. Injection pulses must be visible on the oscilloscope. Foot off accelerator (idle position). No more injection pulses.
- Engine clearly below ambient temperature (+15°C ... +30°C):
As of approx. 2000 min⁻¹ injection pulses must be visible again.
The reinstatement speed is approx. 400 min⁻¹ higher.
- Engine at normal operating temperature (approx. +80°C):
As of approx. 1250 min⁻¹ injection pulses must be visible again.
The reinstatement speed is approx. 400 min⁻¹ higher.
If incorrect: replace control unit.

yes

Continued on G21/G22



Injection pulse of a switched output stage
(Measured at injection valve)
a = Pulse length (depends on engine load)

G 19

Engine missing

Opel Senator, Monza 3.0 E



G 20

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

Yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:
775 ... 825 min⁻¹

Automatic transmission:
675 ... 725 min⁻¹

with on/off ratio:

30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission
(selector lever in
position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

• CO concentration max.

0.5% by vol. CO

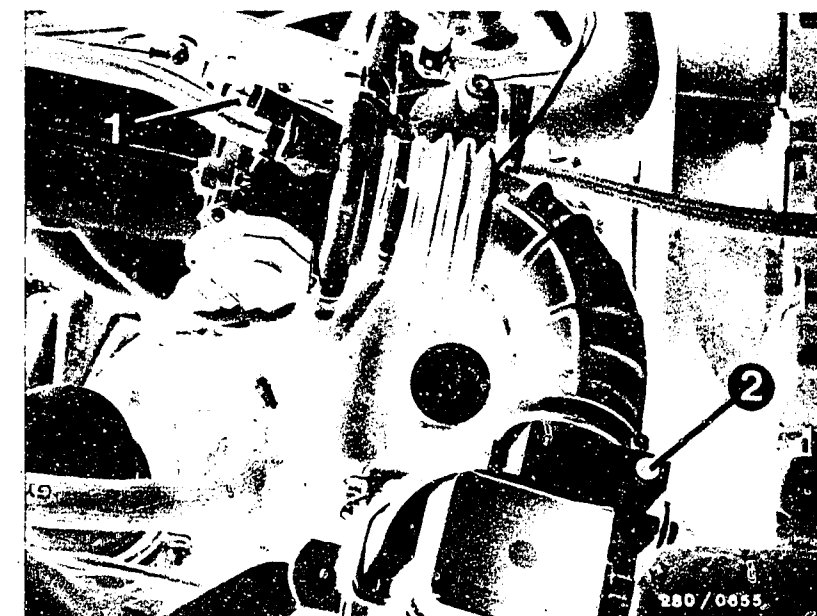
Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation. When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve. It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

Yes

Idle speed not adjustable.

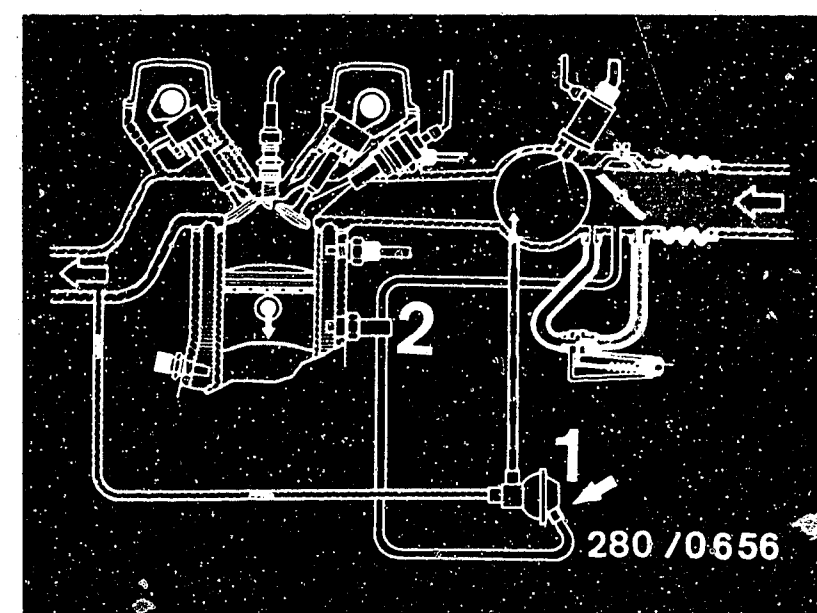
Yes

Continued on G23/G24



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



G21

Engine missing

Opel Senator, Monza 3.0 E



G22

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

For all vehicles:

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction (hexagon-socket-head cap screw AF 5). Test idle speed and CO concentration again. If necessary, make corrections in several steps. After adjusting, use new (red) plugs (1 280 508 012).

yes

Injection valves checked for proper operation?

- Injection pulses without interference or missing?
- Lines correctly routed?
- No loose contacts in plug-in connections?

no

Connect the test lead as follows:

The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.

Caution!

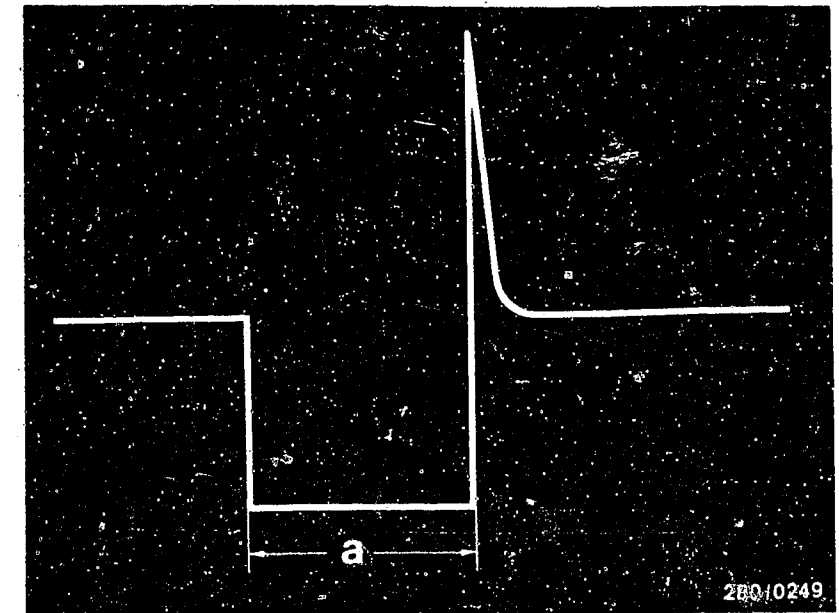
Free terminal must not come into contact with vehicle body.

When the correct terminal is connected, the diagram shown opposite is visible. Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running. If the diagram opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested. In case of interference - check routing of leads.

In case of missing, eliminate loose contacts in leads or in plug-in connections.

yes

Continued on H1/H2



Injection pulse of a switched output stage
(Measured at injection valve)

a = Pulse length (depends on engine load)

G23

Engine missing

Opel Senator, Monza 3.0 E



G24

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

yes

Injection valve mechanically O.K.?

- Does engine speed drop when injection-valve connectors are pulled off individually?

no

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.. If replacing, install only injection valves 0 280 150 205.

Replacing the solenoid-operated injection valves

Pull off the electric terminal.

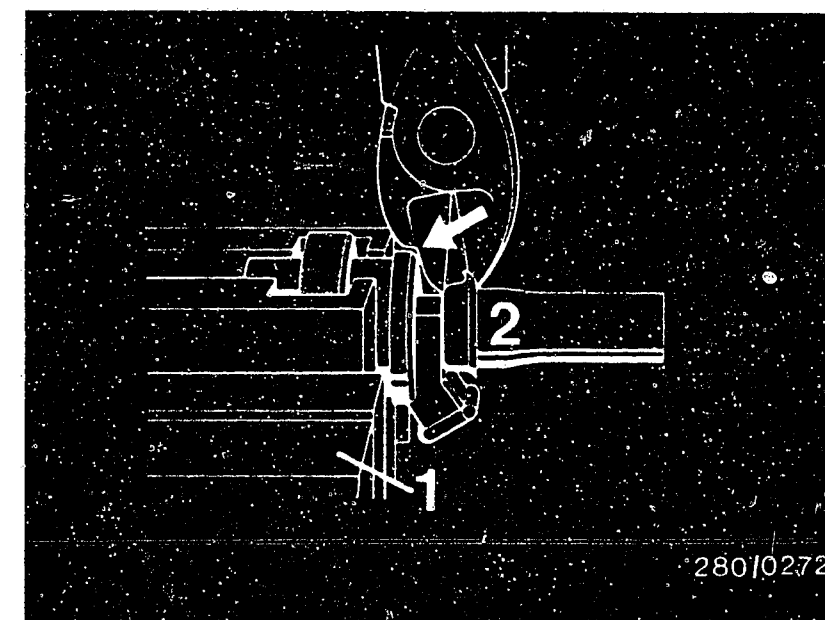
1. Removing the hose

- The fasteners on the injection valve (O-ring) need not be removed.
- Place injection valve in clamping fixture 1 688 120 093 and clamp in vise.
- Cut open hose-termination sleeve with side cutters and remove.
- Cut open the hose lengthways using a soldering iron or soldering gun and pull off.

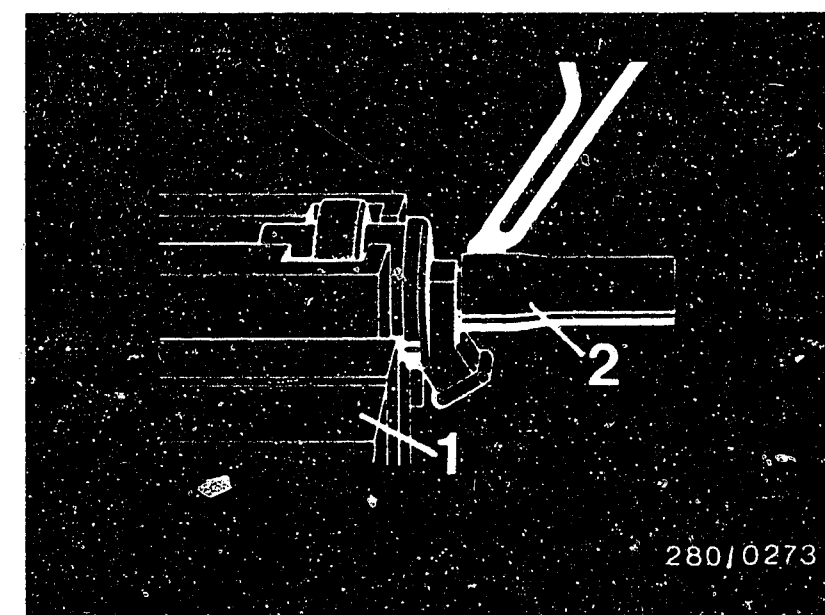
yes

yes

Continued on H3/H4



- 1 = Clamping fixture
(1 688 120 093)
2 = Solenoid-operated injection valve



H1

Engine missing

Opel Senator, Monza 3.0 E



H2

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

Yes

2. Installing the hose

Parts set 1 287 010 701 is required for installation.

- Clean outside of tailpiece.
- Wet new fuel hose with fuel or calibrating oil.
- Press hose and hose-termination sleeve by hand as far as they will go onto the tailpiece using assembly mandrel 1 687 931 003. Hose-termination sleeve must then be tight.

Caution! Do not use hose clamp on tailpiece of injection valve.

Installing the injection valves and the intake manifold.

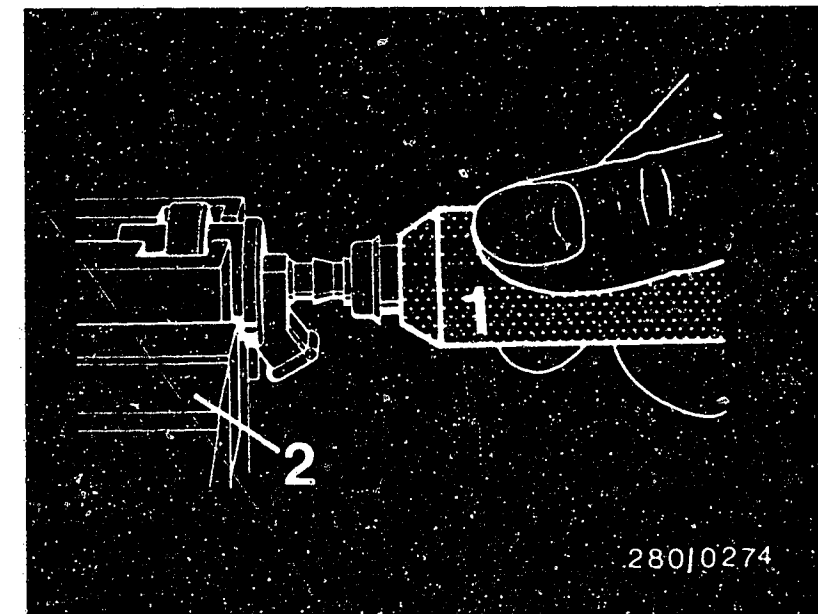
Make sure that the rubber seals on each injection valve are properly seated. Replace seals if defective. Press all 6 solenoid-operated injection valves with the fuel delivery line uniformly into their seats.

Important! All injection valves must have a tight fit.

Tighten central screws making sure that the fastening plate is in good contact with the injection valves. Bring air-flow sensor flap back into rest position or remove wire link from air-flow sensor plug (as the case may be). Disconnect the L-Jetronic tester. Check all fuel and air hose connections once again to see if they are properly attached. Start the engine and check whether any unmetered air is being drawn in.

Yes

Continued on H5/H6



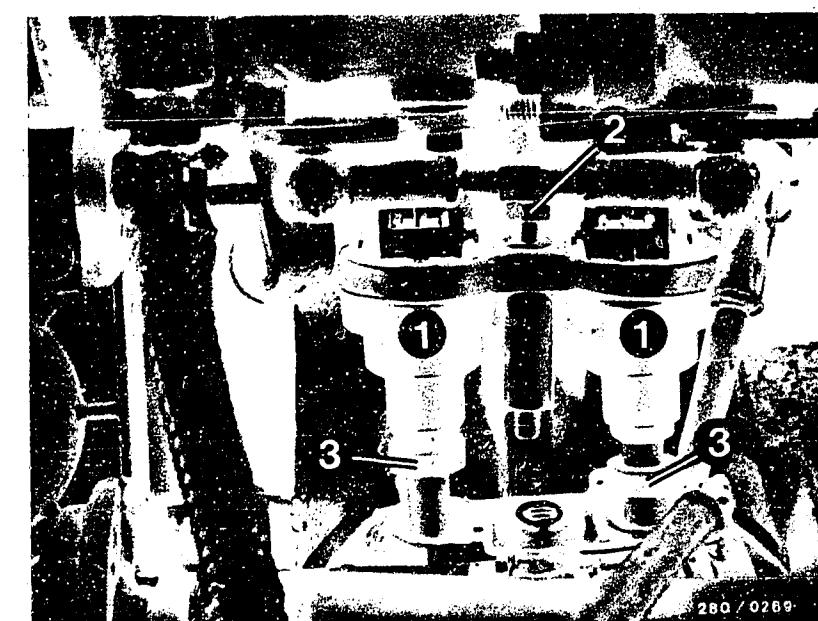
1 = Assembly mandrel
(1 687 931 003)

2 = Clamping fixture
(1 688 120 093)

1 = Solenoid-operated injection
valve

2 = Central screw

3 = O-ring (rubber seal)



H3

Engine missing

Opel Senator, Monza 3.0 E



H4

Engine missing

Opel Senator, Monza 3.0 E



Engine missing under all operating conditions (continued)

Yes

Trouble-shooting program completed for customer complaint

"Engine missing under all operating conditions"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

H5

Engine missinge

Opel Senator, Monza 3.0 E



H6

Engine missinge

Opel Senator, Monza 3.0 E



FUEL CONSUMPTION TOO HIGH

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

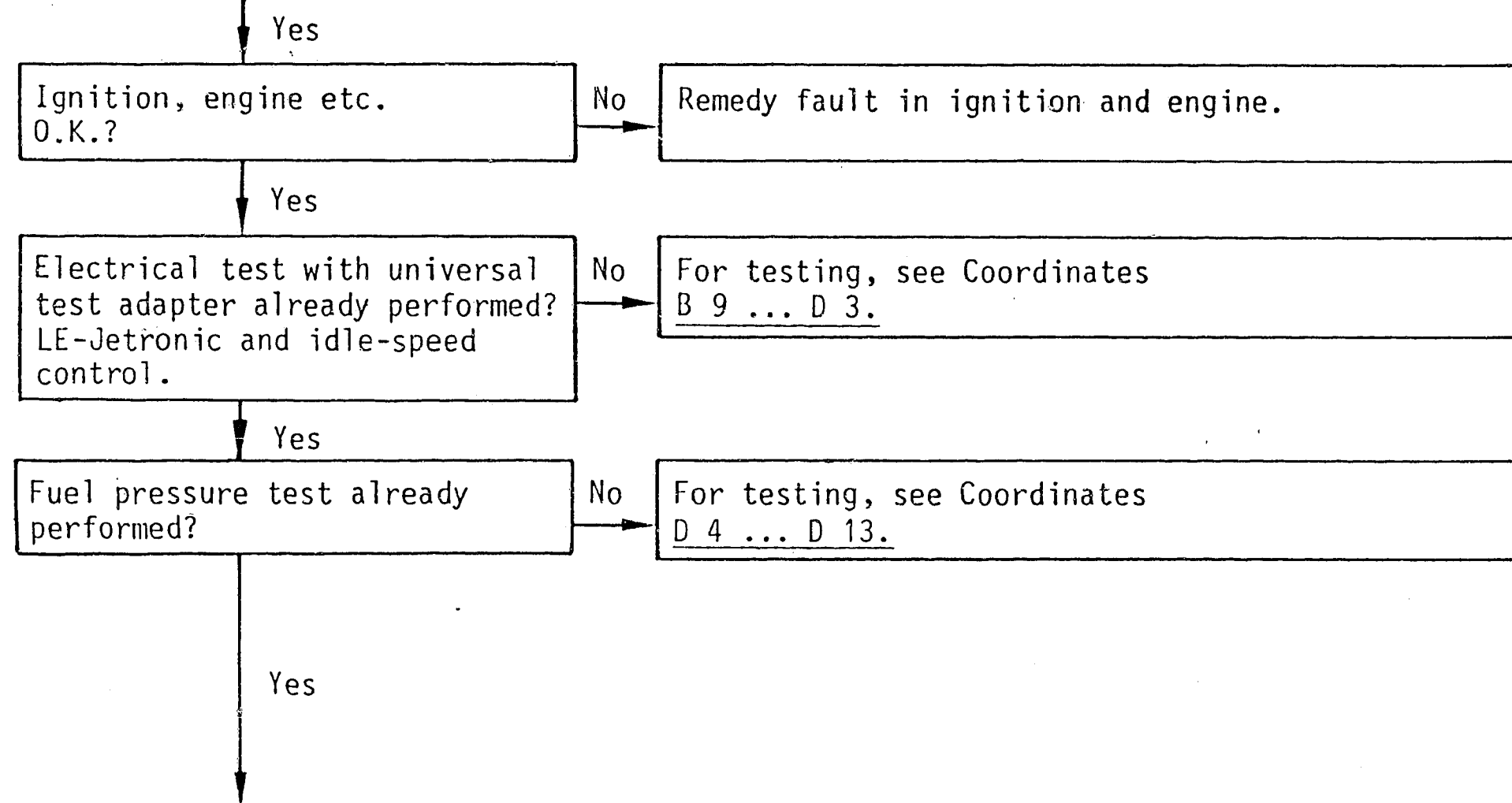
The program is divided into 3 rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING



Continued on H9/H10

H7

Fuel consumption too high
Opel Senator, Monza 3.0 E



H8

Fuel consumption too high
Opel Senator, Monza 3.0 E



Fuel consumption too high (continued)

Yes

Have all brakes released fully?

no

Adjust handbrake and/or drum brake so that there is no friction.

Yes

Test injection valve mechanically.

- Does engine speed drop when injection-valve connectors are pulled off?

no

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.. If replacing, install only injection valves 0 280 150 205.

Replacing the solenoid-operated injection valves

Pull off the electric terminal.

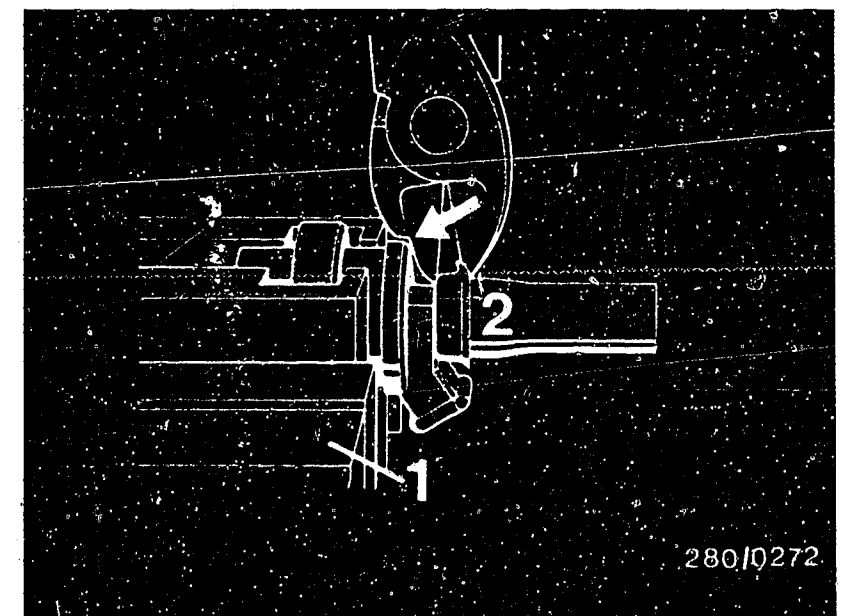
1. Removing the hose

- The fasteners on the injection valve (O-ring) need not be removed.
- Place injection valve in clamping fixture 1 688 120 093 and clamp in vise.
- Cut open hose-termination sleeve with side cutters and remove.
- Cut open the hose lengthways using a soldering iron or soldering gun and pull off.

Yes

Yes

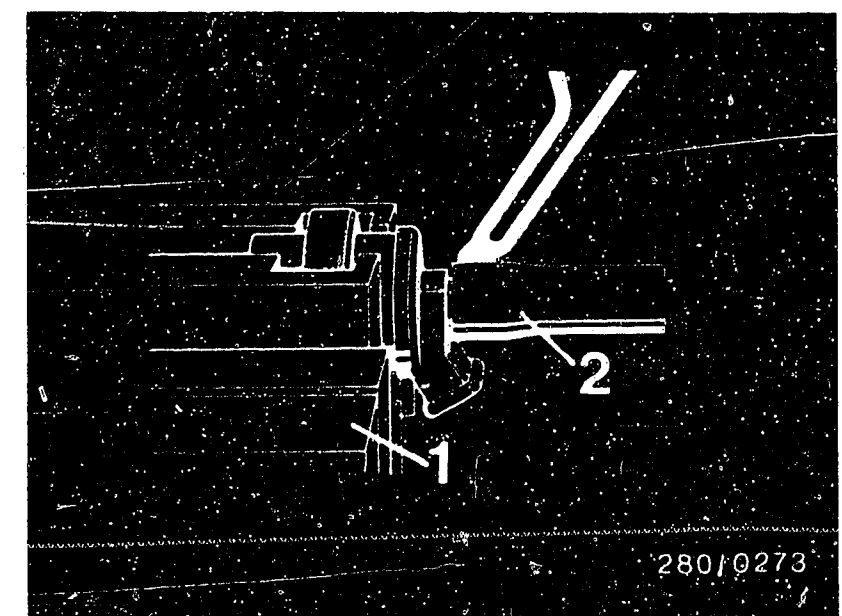
Continued on H11/H12



280/0272

1 = Clamping fixture
(1 688 120 093)

2 = Solenoid-operated injection valve



280/0273

H9

Fuel consumption too high
Opel Senator, Monza 3.0 E



H10

Fuel consumption too high
Opel Senator, Monza 3.0 E



yes

2. Installing the hose

Parts set 1 287 010 701 is required for installation.

- Clean outside of tailpiece.
- Wet new fuel hose with fuel or calibrating oil.
- Press hose and hose-termination sleeve by hand as far as they will go onto the tailpiece using assembly mandrel 1 687 931 003. Hose-termination sleeve must then be tight.

Caution! Do not use hose clamp on tailpiece of injection valve.

Installing the injection valves and the intake manifold.

Make sure that the rubber seals on each injection valve are properly seated. Replace seals if defective. Press all 6 solenoid-operated injection valves with the fuel delivery line uniformly into their seats.

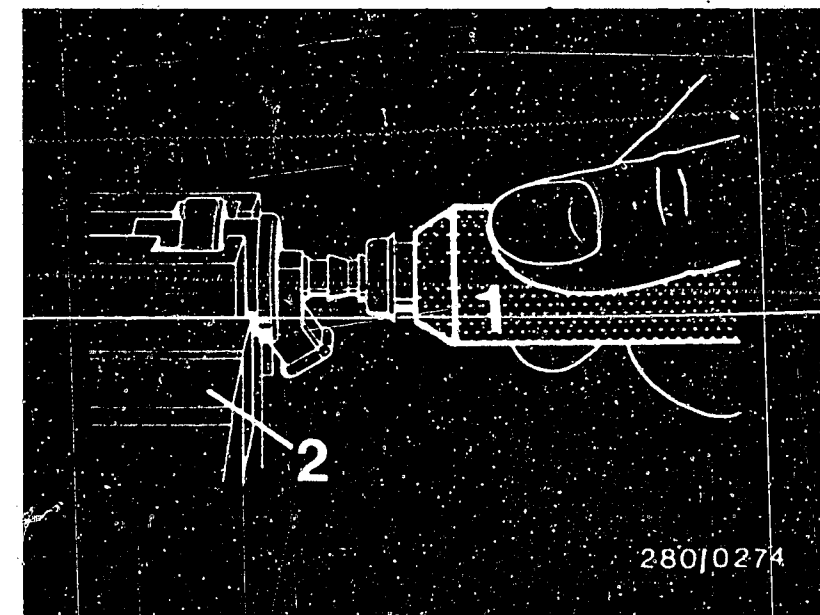
Important! All injection valves must have a tight fit.

Tighten central screws making sure that the fastening plate is in good contact with the injection valves.

Check all fuel and air hose connections once again to see if they are properly attached. Start the engine and check whether any unmetered air is being drawn in.

yes

Continued on H13/H14



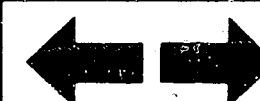
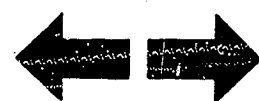
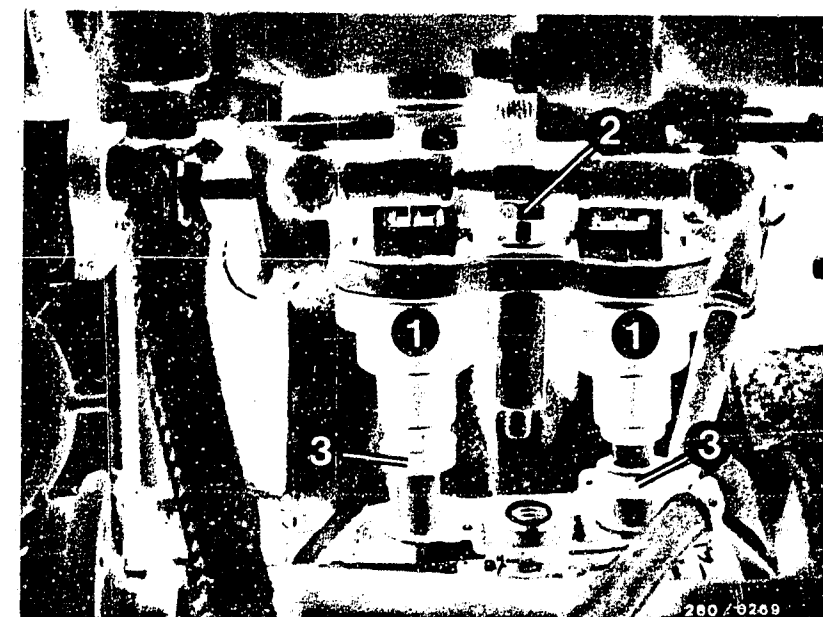
1 = Assembly mandrel
(1 687 931 003)

2 = Clamping fixture
(1 688 120 093)

1 = Solenoid-operated injection valve

2 = Central screw

3 = O-ring (rubber seal)



Fuel consumption too high (continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):

60...1000 Ω

No

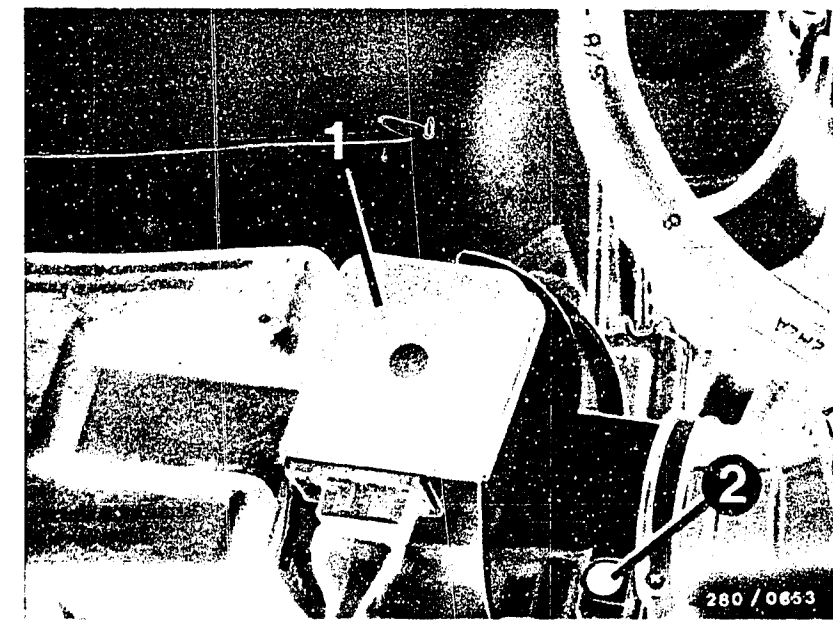
Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.
- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced.
- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.
Test specification: 160...300 Ω
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.
Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

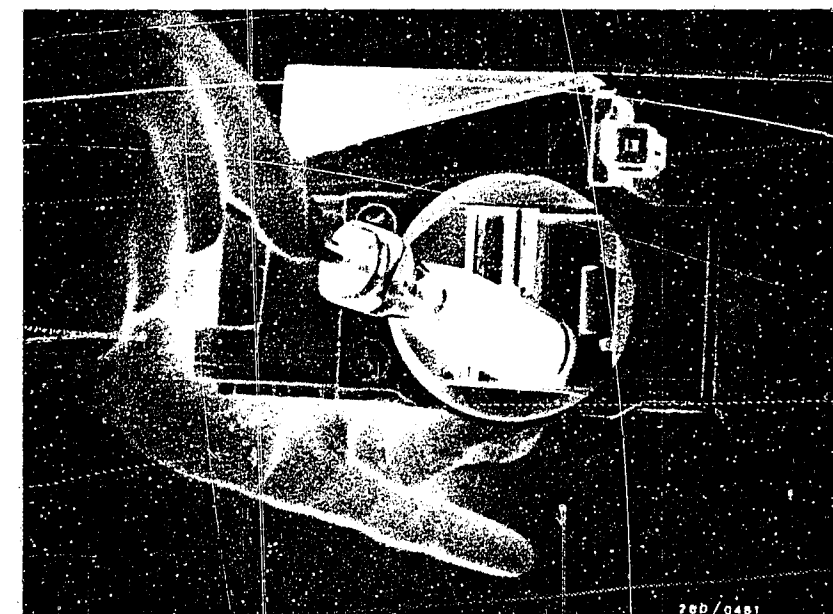
Yes

Continued on H15/H16



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



H13

Fuel consumption too high
Opel Senator, Monza 3.0 E



H14

Fuel consumption too high
Opel Senator, Monza 3.0 E



Fuel consumption too high (continued)

Yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:

775 ... 825 min⁻¹

Automatic transmission:

675 ... 725 min⁻¹

with on/off ratio:

30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission

(selector lever in position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

• CO concentration max.

0.5% by vol. CO

Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation.

When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve.

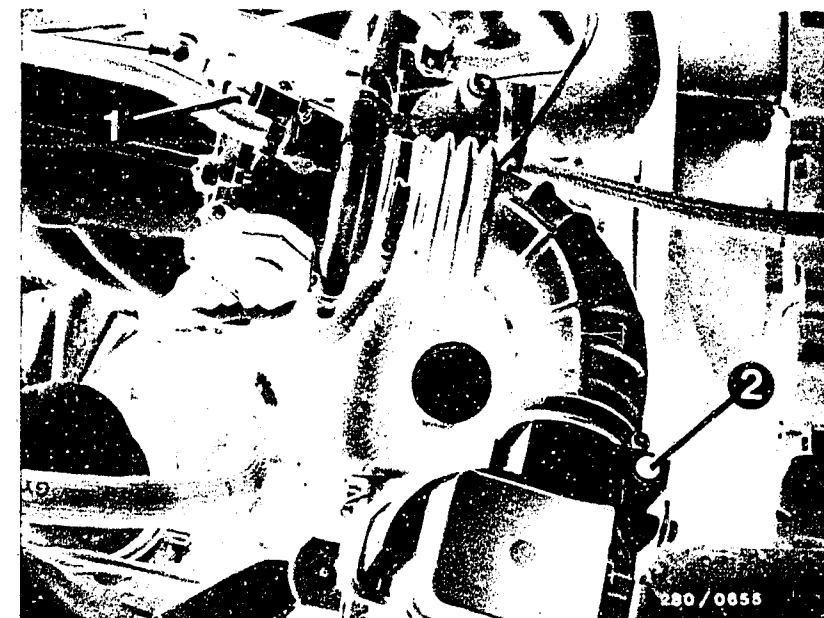
It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

Yes

Idle speed not adjustable.

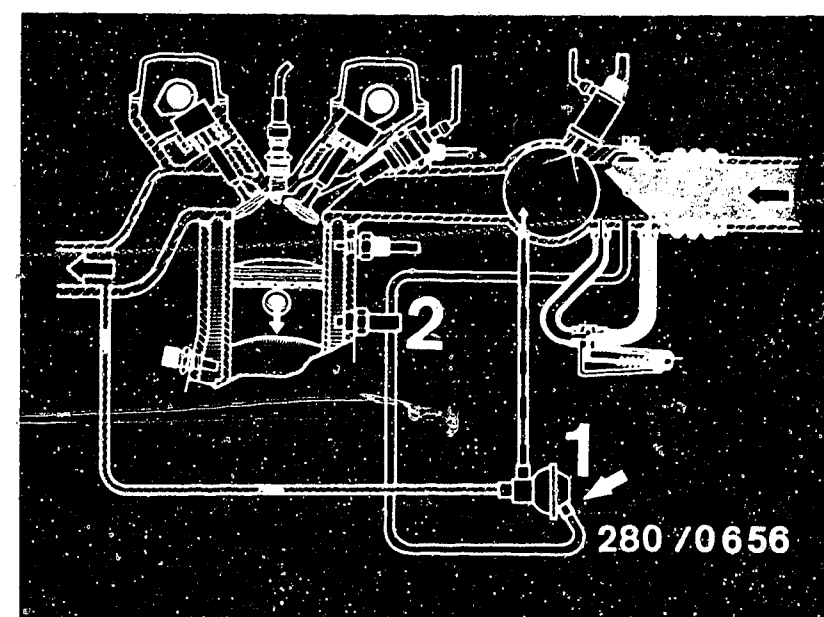
Yes

Continued on H17/H18



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



H15

Fuel consumption too high

Opel Senator, Monza 3.0 E



H16

Fuel consumption too high

Opel Senator, Monza 3.0 E



Fuel consumption too high (continued)

For all vehicles:

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction (hexagon-socket-head cap screw AF 5). Test idle speed and CO concentration again. If necessary, make corrections in several steps. After adjusting, use new (red) plugs (1 280 508 012).

yes

Trouble-shooting program for customer complaint

"Fuel consumption too high"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

H17

Fuel consumption too high
Opel Senator, Monza 3.0 E



H18

Fuel consumption too high
Opel Senator, Monza 3.0 E



MAXIMUM ENGINE POWER/TOP SPEED NOT REACHED

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

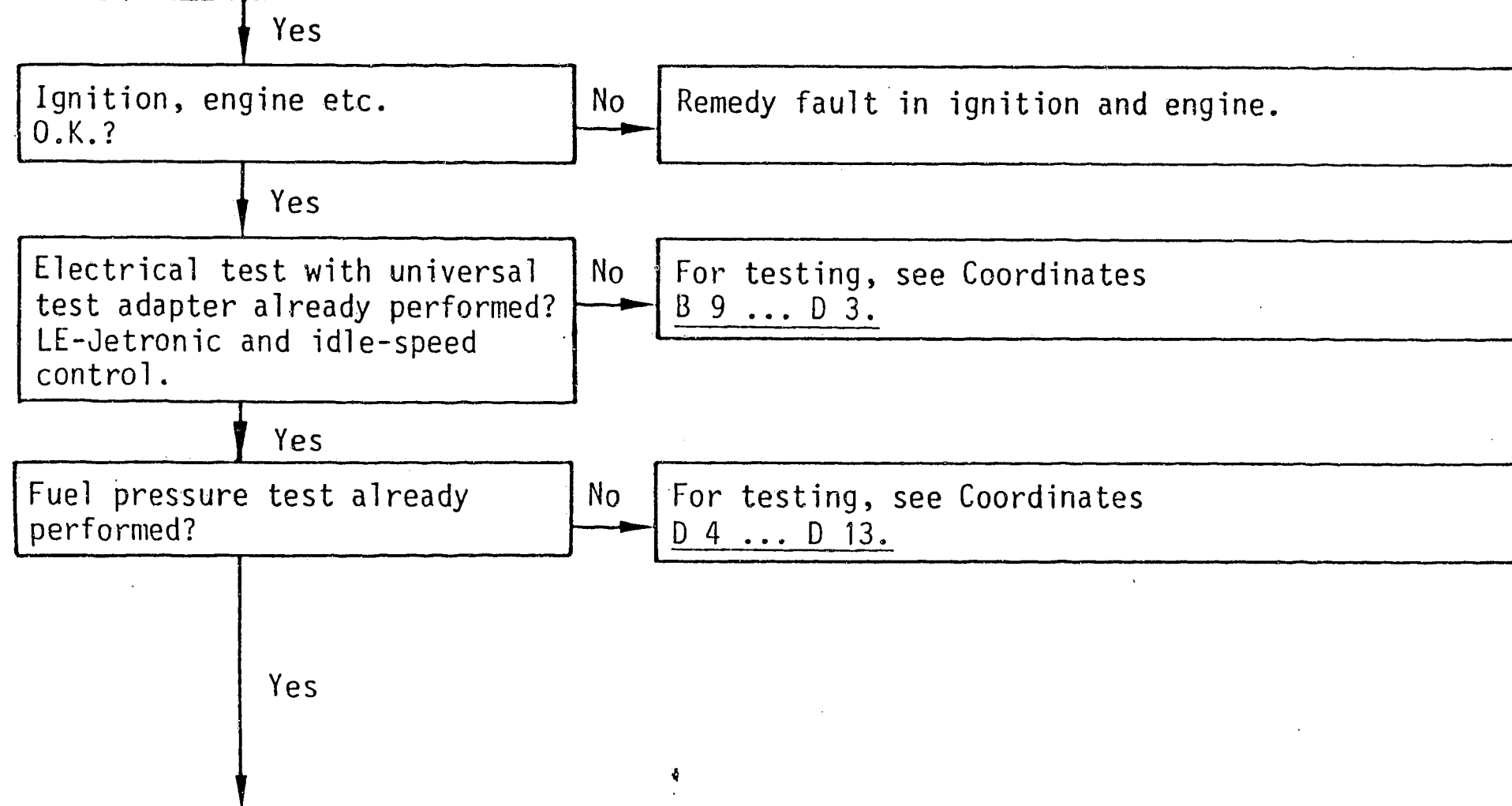
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- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING



Continued on H21/H22

H19

No maximum engine power
Opel Senator, Monza 3.0 E



H20

No maximum engine power
Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

Yes

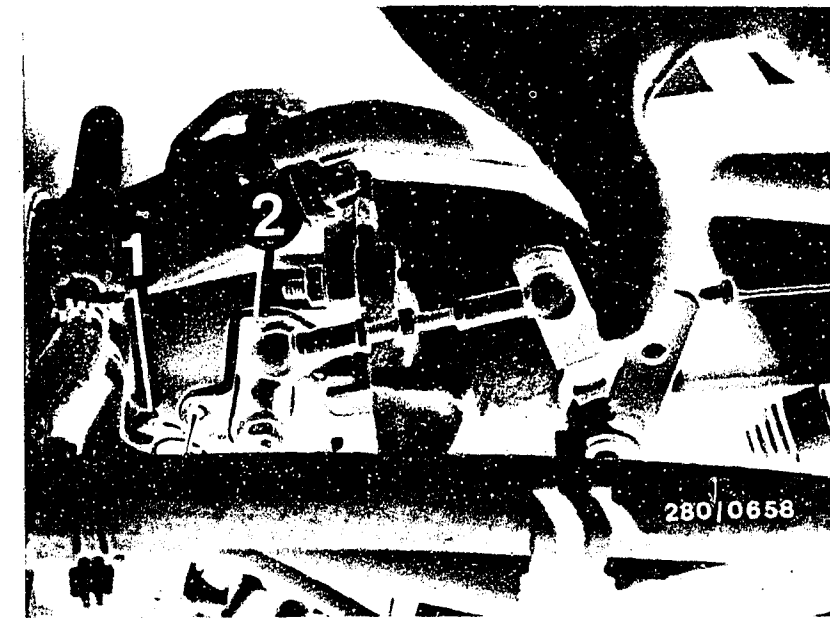
Throttle valve opening fully?

no

- Test accelerator, throttle linkage and throttle cable.
- Throttle linkage may stick due to floor mat.
- If throttle cable kinked - replace.

Yes

Continued on H23/H24



1 = Throttle-valve stop screw
2 = Throttle lever

H21

No maximum engine power
Opel Senator, Monza 3.0 E



H22

No maximum engine power
Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

Yes

Throttle-valve switch O.K.?

- Does the length of the injection pulses change at idle when bridging term. 3 and term. 18 (full-load enrichment)?

No

Connect test lead as follows:

One connection of the test lead is connected between an injection valve and its test leads. Of the other two connection clamps, only one clamp must be connected to the special input of the motortester.

Caution!

The other connection clamp must not come into contact with the vehicle body.

If the correct connection clamp is connected, the oscilloscope pattern shown opposite is visible. With the aid of the test lead it is possible with an ignition oscilloscope to test the injection pulses at the injection valves with the engine running.

Observe the injection pulses at idle. Remove throttle-valve switch plug and bridge term. 3 and term. 18 (insulated wire jumper).

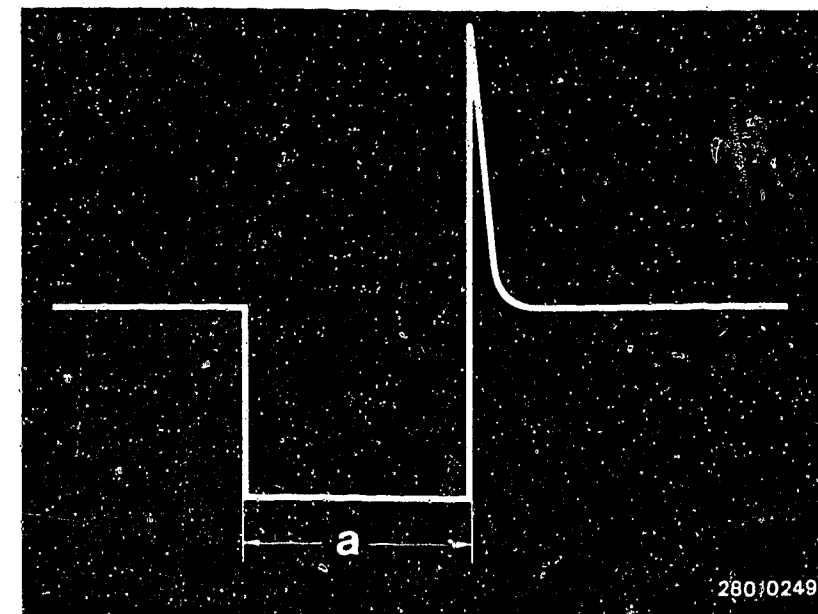
Caution!

Do not bend any terminals. Injection pulse must become longer.

If not: Check for continuity in connecting leads from multiple plug to throttle-valve switch (term. 3 and term. 18). If O.K., replace control unit.

Yes

Continued on J1/J2



Injection pulse of a switched output stage
(Measured at injection valve)

a = Pulse length (depends on engine load)

H23

No maximum engine power
Opel Senator, Monza 3.0 E



H24

No maximum engine power
Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

Yes

Delivery of electric fuel pump
O.K.?

Test specification:
min. 850 cm³/30 s

no

- Measuring the fuel delivery.
For testing, undo junction between fuel return hose (from pressure regulator) and fuel return line (to fuel tank).
If necessary, extend hose and lead into a 5 l vessel with graduated scale.
Disconnect control relay. Insert jumper between term. 87b and term. 30 in connection base.
Electric fuel pump must operate.
Test specification:
at least: 850 cm³/30 s

Caution!

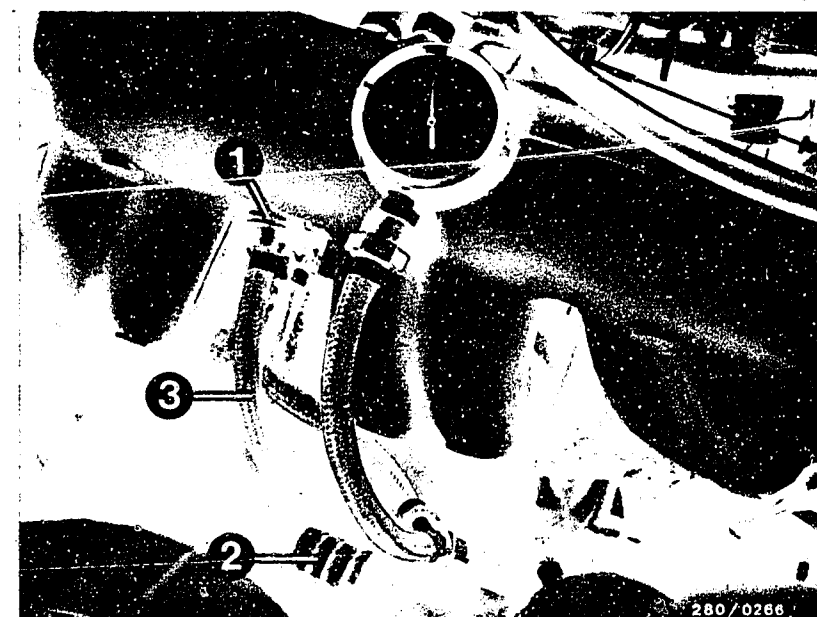
Jumper must be removed again after testing is completed.

Remedy if test specification not reached:

- Fuel filter clogged - replace.
- Voltage across terminals of electric fuel pump with engine running: min. 12 V. If not, clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective - replace.
- If delivery too low, replace electric fuel pump.

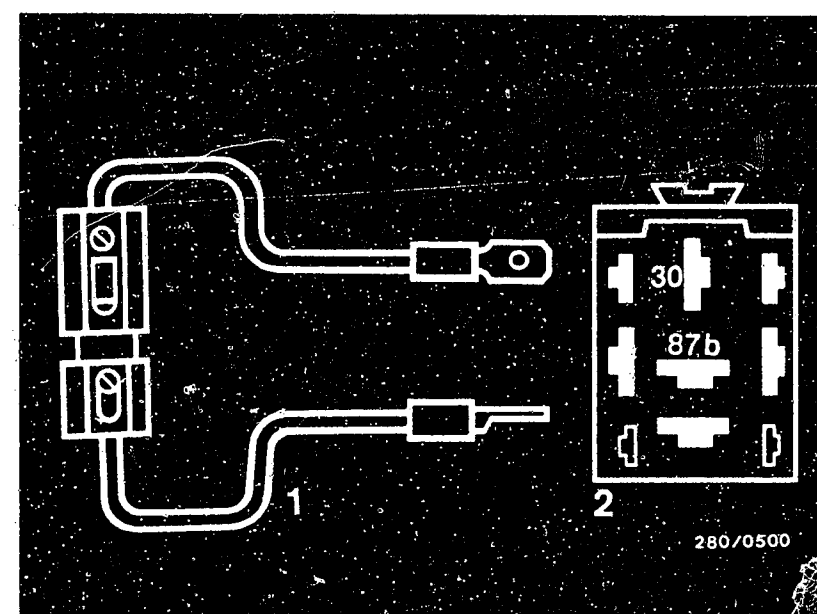
Yes

Continued on J3/J4



- 1 = Pressure regulator
- 2 = Fuel return line
- 3 = Fuel return hose

- 1 = Jumper with fuse holder and 10A fuse (user-fabricated)
- 2 = Top view of connection base



J1

No maximum engine power
Opel Senator, Monza 3.0 E



J2

No maximum engine power
Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):

60...1000 Ω

No

Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.

- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent.

The air-flow sensor must be replaced.

- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

Test specification: 160...300 Ω

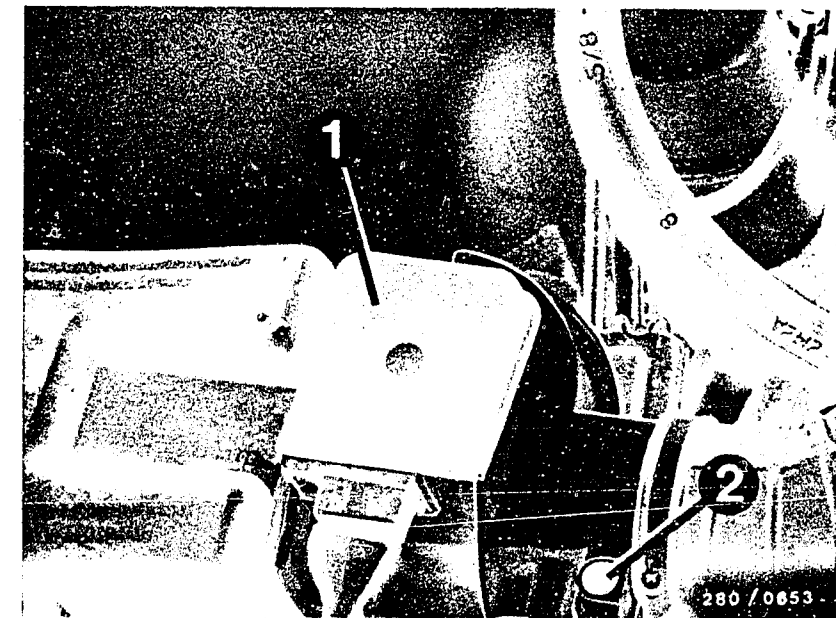
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.

Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

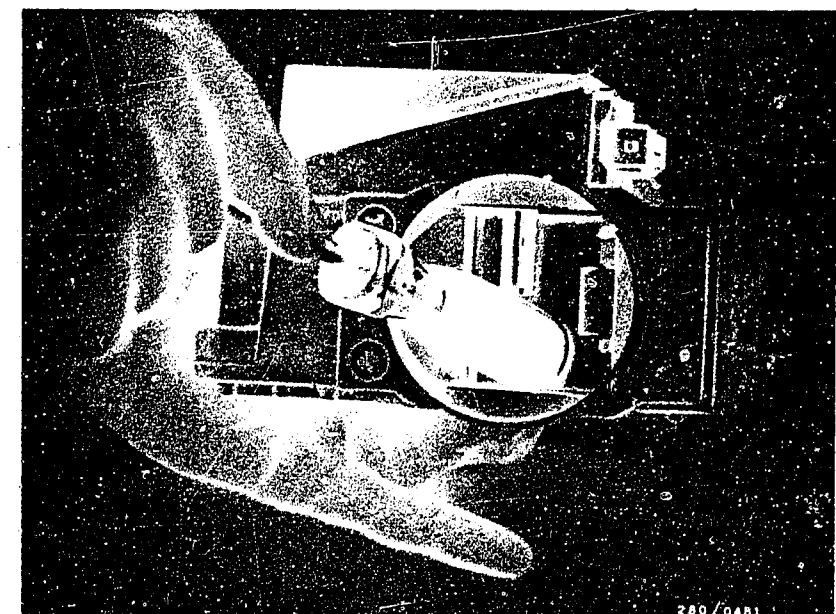
Yes

Continued on J5/J6



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



J3

No maximum engine power

Opel Senator, Monza 3.0 E



J4

No maximum engine power

Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

Yes

Check air-intake system for leaks.

- Are all hose lines correctly attached.
(Visual examination.)
- Hoses kinked or damaged?
- Air-intake system tested for leaks with 0.3 bar gauge pressure.

no

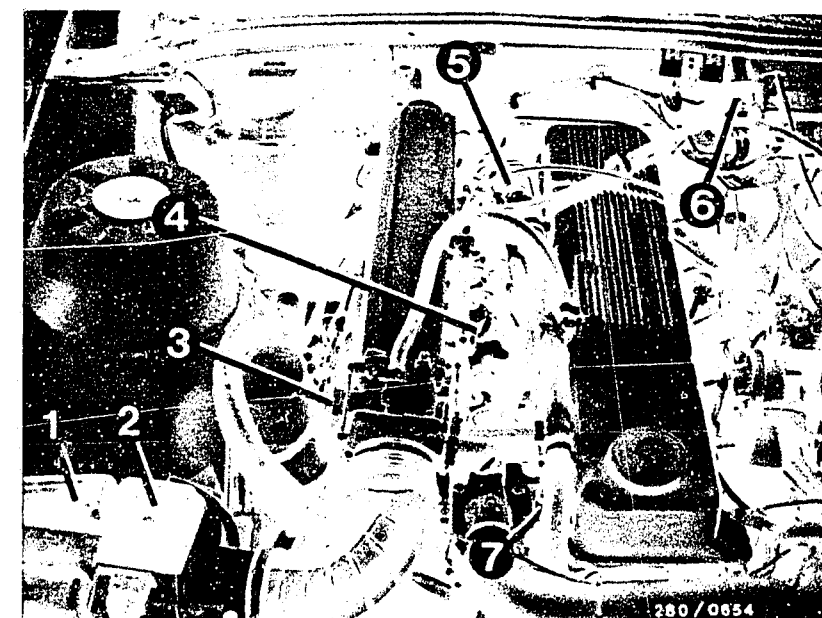
- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

• Leak test:

Seal off exhaust tail pipe.
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Pull off hose after auxiliary air device and, using compressed-air gun, blow air (0,3 bar gauge pressure) into the intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc.
Bubbling or foaming indicates a leak.

Yes

Continued on J7/J8



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor
(engine temperature
NTC II)

J5

No maximum engine power
Opel Senator, Monza 3.0 E



J6

No maximum engine power
Opel Senator, Monza 3.0 E



Maximum engine power/top speed not reached (continued)

yes

Trouble-shooting program for
customer complaint

"Maximum engine power/top
speed not reached"

Fault remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

J7

No maximum engine power
Opel Senator, Monza 3.0 E



J8

No maximum engine power
Opel Senator, Monza 3.0 E



IDLE SPEED AND CO CONCENTRATION TOO LOW OR TOO HIGH

Trouble-shooting program according to customer complaints

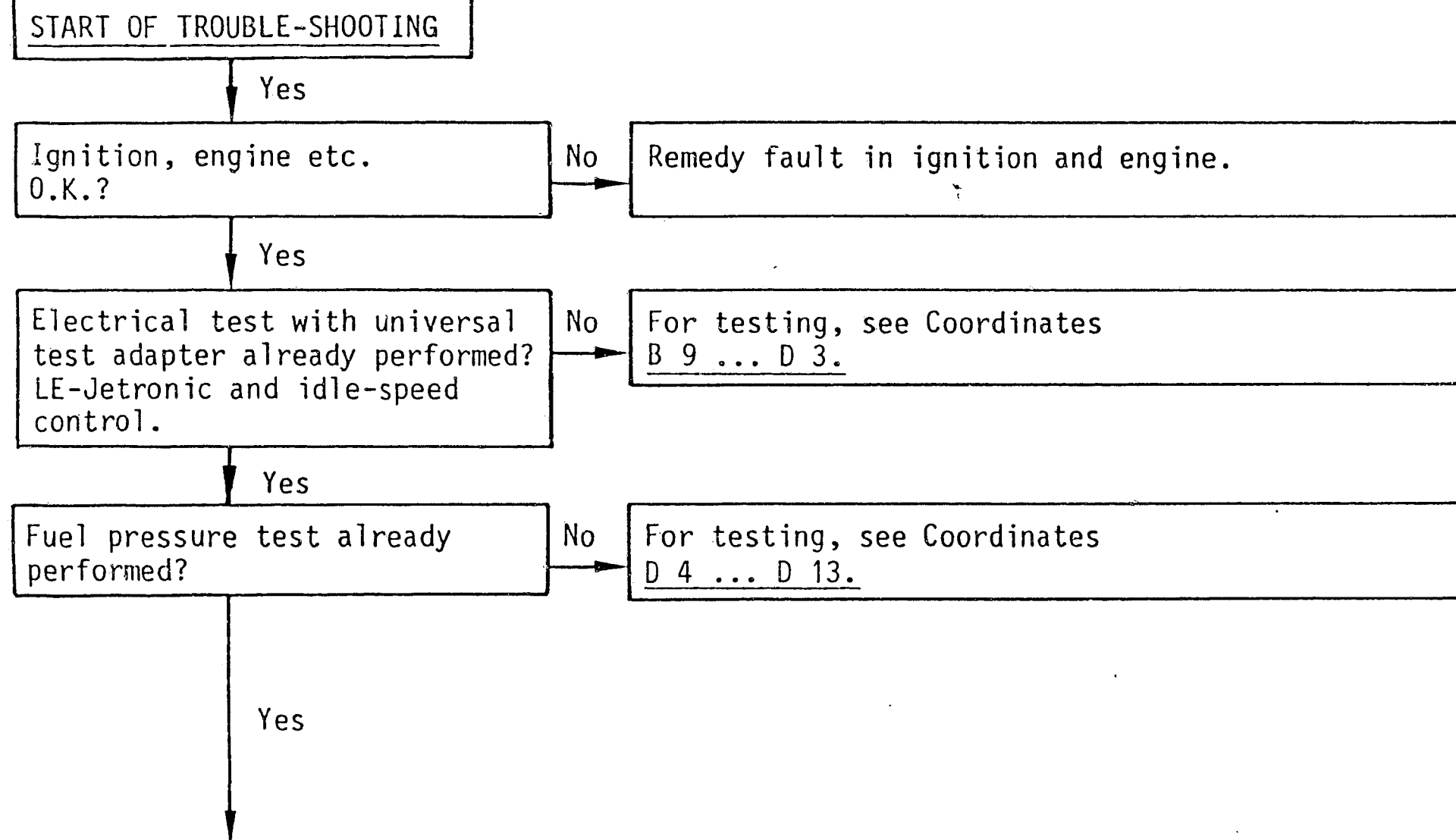
How to use the following trouble-shooting program

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If the questions can be answered conclusively with "yes" without testing, proceed to the next question below. If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on J11/J12

J9

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



J10

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



Idle speed and CO concentration too low or too high (continued)

Yes

Test idle speed, on/off ratio and CO concentration.

• Idle speed

Manually-shifted transmission:
775 ... 825 min⁻¹

Automatic transmission:
675 ... 725 min⁻¹

with on/off ratio:

30 ... 34 %

• CO concentration:

max. 0.5 % by vol. CO

no

• Idle speed and CO adjustment

Adjust exhaust gas with exhaust-gas analyzer with engine at normal operating temperature (approx. +80°C) and at idle speed. Render exhaust-gas recirculation (as of 9.83) inoperative.

• Idle speed

Manually-shifted transmission: 775...825 min⁻¹

Automatic transmission
(selector lever in
position P):

675...725 min⁻¹

with on/off ratio

30 ... 34 %

• CO concentration max.

0.5% by vol. CO

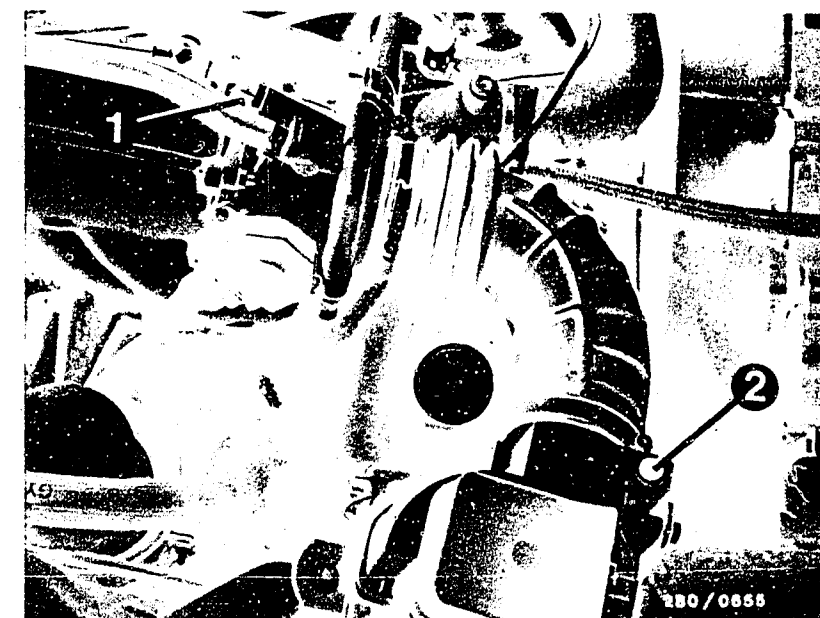
Due to certain exhaust emission regulations these vehicles are equipped with exhaust-gas recirculation. When testing and adjusting the idle speed and CO concentration, it must be ensured that the exhaust-gas recirculation system is inoperative. To do this, remove and seal off the vacuum control line (arrow) on the EGR valve. It is not necessary to shut down the exhaust-gas recirculation system if the vehicle is operated in countries not having such stringent exhaust emission legislation.

Yes

Idle speed not adjustable.

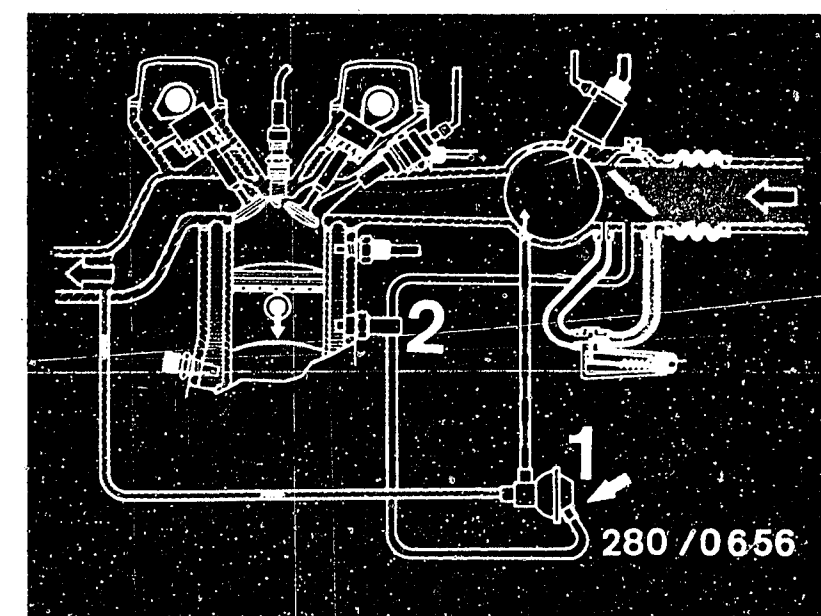
Yes

Continued on J13/J14



1=Idle-speed adjusting screw for on/off ratio of idle-speed control
2=CO adjusting screw

1=EGR valve
2=Thermo-valve



J11

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



J12

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



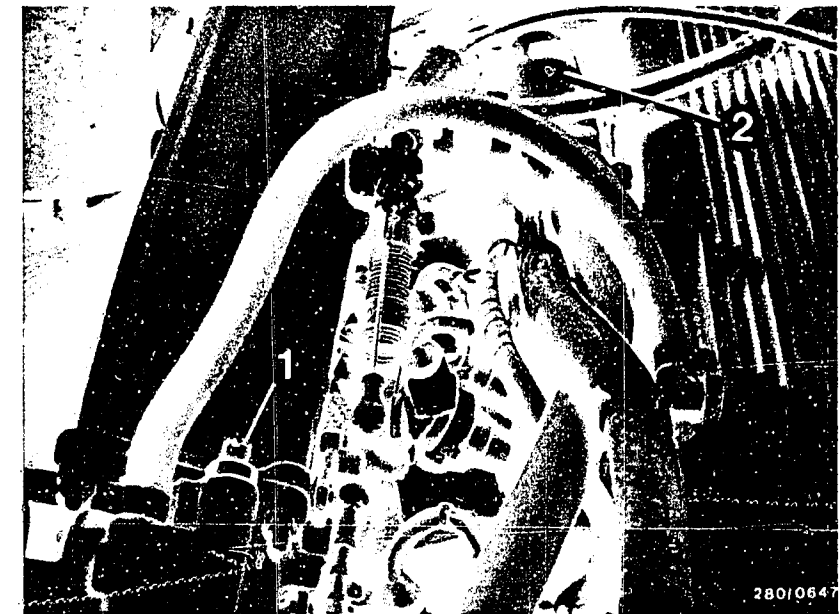
Idle speed and CO concentration too low or too high (continued)

Yes

On all vehicles:

If CO concentration too high, turn CO adjusting screw in air-flow sensor half a turn in a counter-clockwise direction (hexagon-socket-head cap screw AF = 5 mm). Check idle speed and CO concentration again.

If necessary, make corrections in several steps. After adjusting, use new red plug (1 280 508 012).



1 = Idle-speed adjusting screw
2 = Idle actuator

Test idle actuator mechanically.

- Engine-speed drop when hose pinched off? (Engine cold)
- Does idle actuator vibrate with engine running?

no

Functional test of idle actuator

- With engine cold, pinch off hose to idle actuator. Engine speed must drop noticeably.
- Idle actuator must vibrate noticeably with the engine running.

If not, replace idle actuator.

Yes

Continued on J15/J16

J13

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



J14

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



Idle speed and CO concentration too low or too high (continued)

Yes

Air-flow sensor mechanically and electrically O.K.?

- Air-flow sensor flap moves freely?
- Air-flow sensor flap returns to rest position?
- Resistance values within tolerance?

Between term. 8 and term. 9:
160...300 Ω

Between term. 7 and term. 5
(deflect air-flow sensor flap):
60...1000 Ω

No

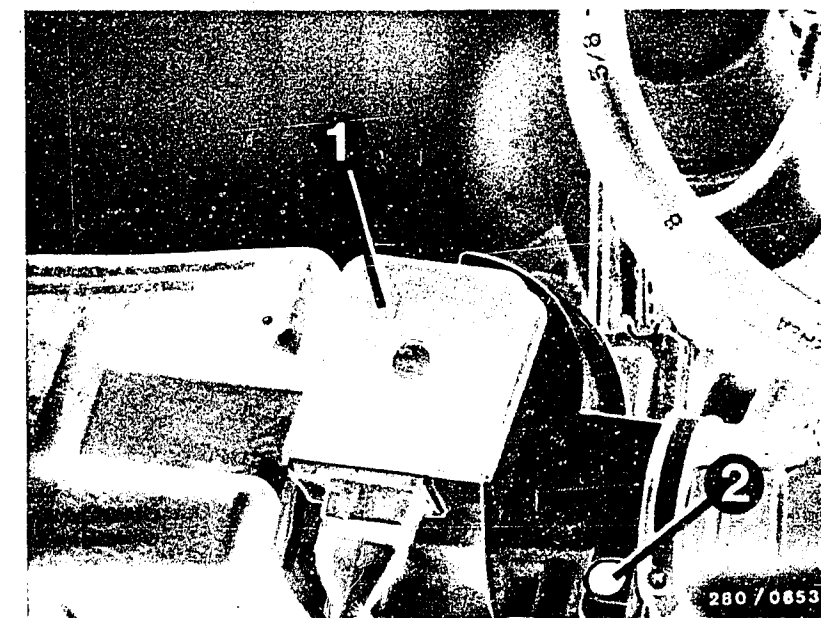
Testing:

- Unscrew air-flow sensor from air-filter housing. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. The sensor flap must close again fully by itself. Sensor flap must not catch when being opened. Watch for signs of abrasion and rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace air-flow sensor.
- Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced.
- Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.
Test specification: 160...300 Ω
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor, deflect air-flow sensor flap.
Test specification: 60...1000 Ω

Caution: After testing is completed, the air-flow sensor must be screwed back onto the air-filter housing.

Yes

Continued on J17/J18



1 = Air-flow sensor
2 = CO adjusting screw

Opening the air-flow sensor flap



J15

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



J16

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



Idle speed and CO concentration too low or too high (continued)

yes

CO concentration below
0.5 % by vol. ?

no

- Check whether hoses of air-intake system and of fuel line system are correctly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by re-tightening the connecting screws.

• Leak test:

Seal off exhaust tail pipe.
Unscrew air-flow sensor from air-filter housing and seal off air-flow sensor duct.
Pull off hose after auxiliary air device and, using compressed-air gun, blow air (0,3 bar gauge pressure) into the intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Leaks may also occur at the following points on the engine: Oil dipstick incorrectly inserted, defective oil filler neck lid seal etc. Bubbling or foaming indicates a leak.

yes

Trouble-shooting program for
customer complaint

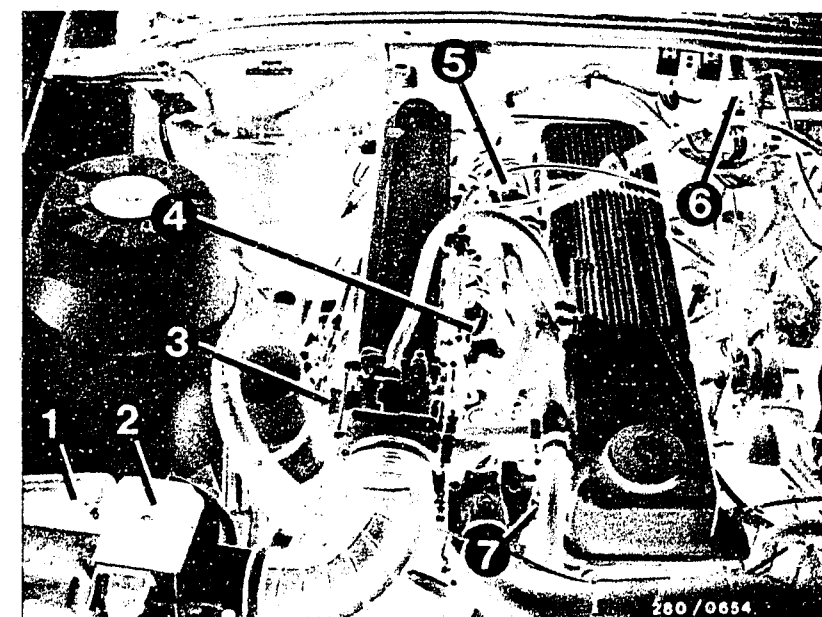
"Idle speed and CO concentration
too low or too high"

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting". (Coordinates B 3/B 4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

Fault remedied?



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Throttle-valve switch
- 4 = Injection valves
- 5 = Idle actuator
- 6 = Control relay
- 7 = Double temperature sensor
(engine temperature
NTC II)

J17

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



J18

Idle speed and CO concentration
Opel Senator, Monza 3.0 E



After-sales Service

Technical Bulletin

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CAR ALARM II - 0 335 411 901 -

VDT-I-335/108 En

in vehicles with

12.1983

L-Jetronic (L1, LE1, LE2), Motronic,

Replaces Ed. 6.1981

TCI-h, TI-h, TCI-i, TI-i

and VDT-I-335/110, 10.1981

VDT-I-335/111, 11.1981

VDT-I-261/101, 7.1981

VDT-I-227/106, 5.1981

VDT-I-280/103, 7.1981

In cases where Car Alarm II is retrofitted in vehicles the engines of which are fitted with L-Jetronic, Motronic, TCI-h, TCI-i (trigger box in discrete design) or with TI-h, TI-i (trigger box in hybrid design), then terminal 1 of the ignition coil must not be connected to terminal "C" of the alarm relay. When the alarm system is switched on, terminal "C" of the alarm relay is switched internally to vehicle ground. This would mean that when attempts are made to start the vehicle with the alarm switched on, the ignition coil and the trigger box/control units of the systems in question would be destroyed.

For vehicles with Motronic, we formerly recommended switching off the supply voltage to the Motronic control unit. Please do not switch this supply off any more. There is now a new circuit whereby the electric fuel-pump relay is switched off via the "primed" alarm system.

This also means though, that full protection against theft is no longer possible as would normally be the case with the ignition switched off and with the alarm installation primed.

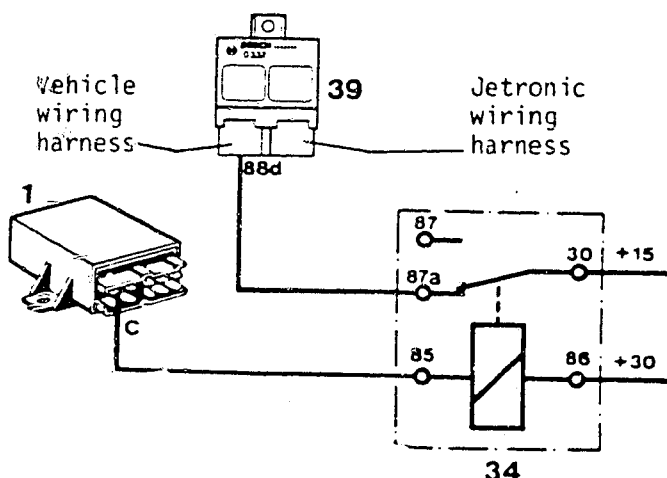
Circuits have now been developed which ensure complete theft protection for vehicles with the systems mentioned above.

Circuit 1

Description of the circuit for vehicles with L-Jetronic

Open-circuit the line from the relay combination terminal 88d to the fuel pump with an additional relay (34). In this way the supply voltage to the fuel pump will be switched off when the alarm system is "primed," i.e. no more fuel is supplied.

- 1 Alarm relay
- 34 Additional relay 0 332 204 150
(transfer contact relay, used
here as break contact)
- 39 Relay combination of L-Jetronic



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Opel Senator, Monza 3.0 E

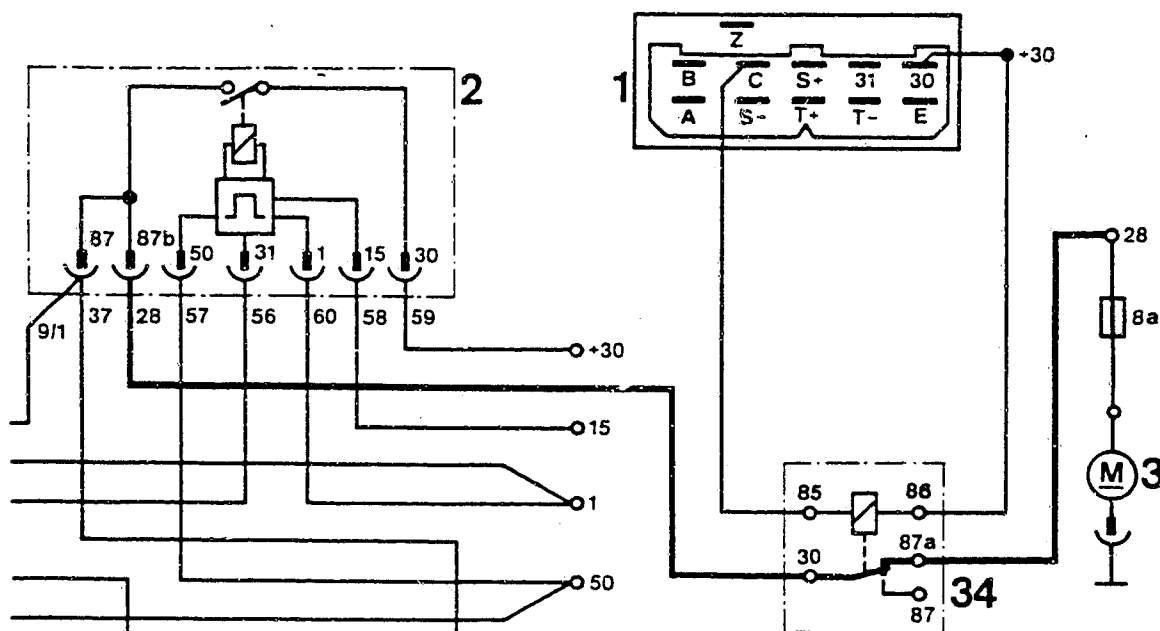


Circuit 2

Description of the circuit for vehicles with LE1/LE2-Jetronic

Open-circuit the line from the control relay terminal 87b to the fuel pump with an additional relay (34). In this way the fuel pump will be switched off when the alarm system is primed, i.e. no more fuel will be supplied.

Circuit diagram for the LE version



1 = Alarm relay
2 = Control relay for LE versions

3 = Electric fuel pump
34 = Additional relay
0 332 204 150

Circuit 3

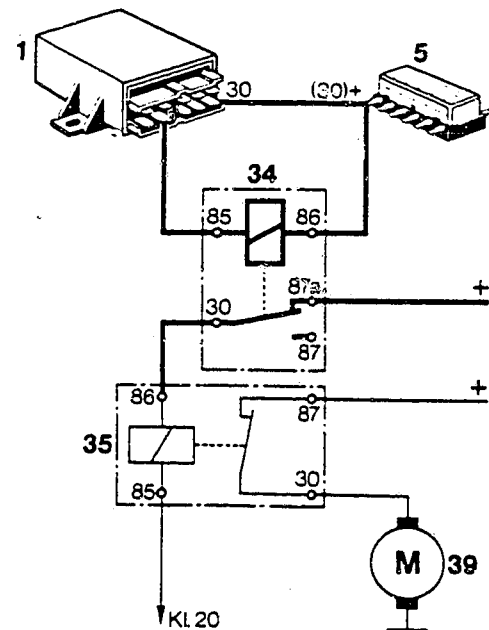
Description of the circuit for vehicles with Motronic (e.g. BMW and Porsche)

Formerly, we recommended switching off the supply voltage to the Motronic control unit as a protection against theft. Please do not switch this supply off any more. There is now a new circuit whereby the electric fuel-pump relay is switched off via the "primed" alarm system.



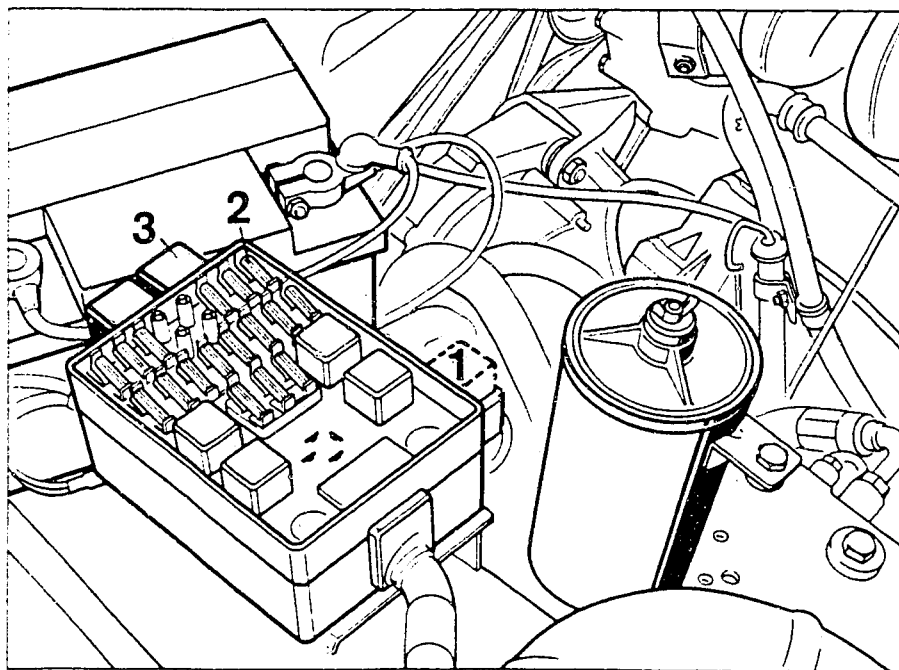
Circuit 3
for vehicles with Motronic

- 1 = Alarm relay
- 5 = Fuse box
- 34 = Additional relay 0 332 204 150
- 35 = Electric fuel-pump relay
- 39 = Electric fuel pump
- Term.20 = Cable to term. 20 of Motronic control unit



Kl. = terminal

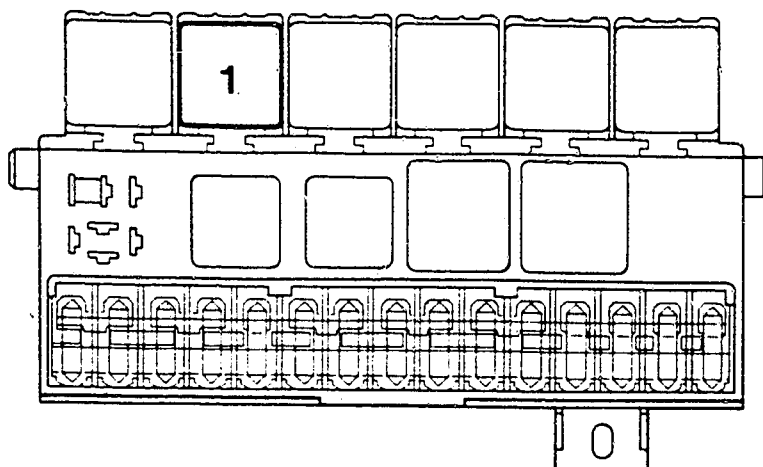
Installation position of the relay for the electric fuel pump in a BMW



- 1 = Electric fuel-pump relay (installation position in vehicles up to date of construction 8.1980)
- 2 = Fuse (16 A) for electric fuel pump
- 3 = Electric fuel-pump relay (installation position in vehicles as from date of construction 8.1980)



Installation position of the electric fuel pump in a Porsche



Central electrics

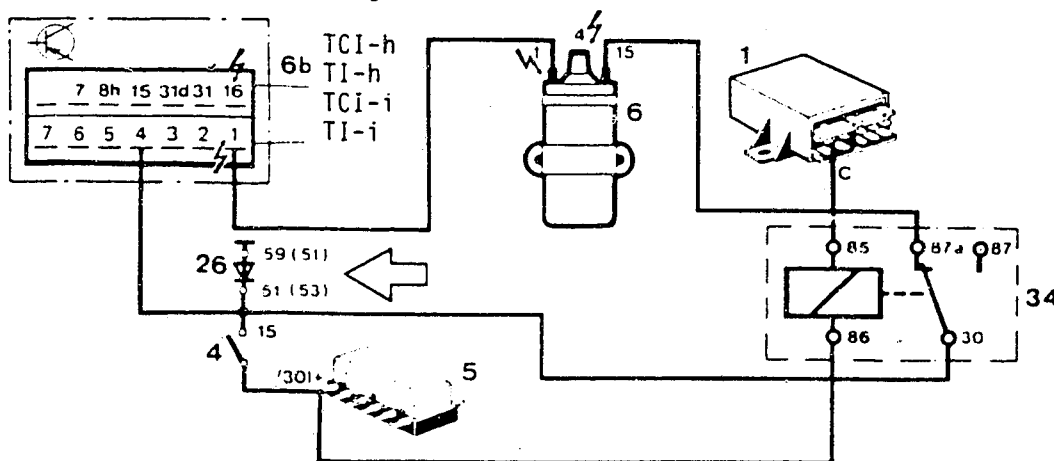
1 = Electric fuel-pump relay

Circuit 4

Description of the circuit for vehicles with:

- standard fitted TCI-h, TCI-i (trigger box in discrete form)
TI-h, TI-i (trigger box in hybrid form);
- retrofitted TCI-h, providing the vehicles have a resistance cable between the ignition-and-starting switch and ignition-coil terminal 15;
- retrofitted TCI-h, if the existing resistance cable in the vehicle between the ignition-and-starting switch and ignition-coil terminal 15 has been replaced by a new cable (1.5 mm²).

Open-circuit the line to ignition-coil terminal 15 with an additional relay (34). A protecting diode (26) must also be wired between the ignition-and-starting switch terminal 15 and ground.



- 1 = Alarm relay
- 4 = Ignition-and-starting switch
- 5 = Fuse box
- 6 = Ignition coil

- 6b = Trigger box TCI-h/TI-h, TCI-i/TI-i
- 26 = Protecting diode 0 212 911 001
- 34 = Additional relay 0 332 204 150
 (change-over contact, here as NC-contact)

Please note: As from date of manufacture FD 832, the terminal designations of the protecting diode (26) have been changed. Old designations in brackets.



Circuit 5

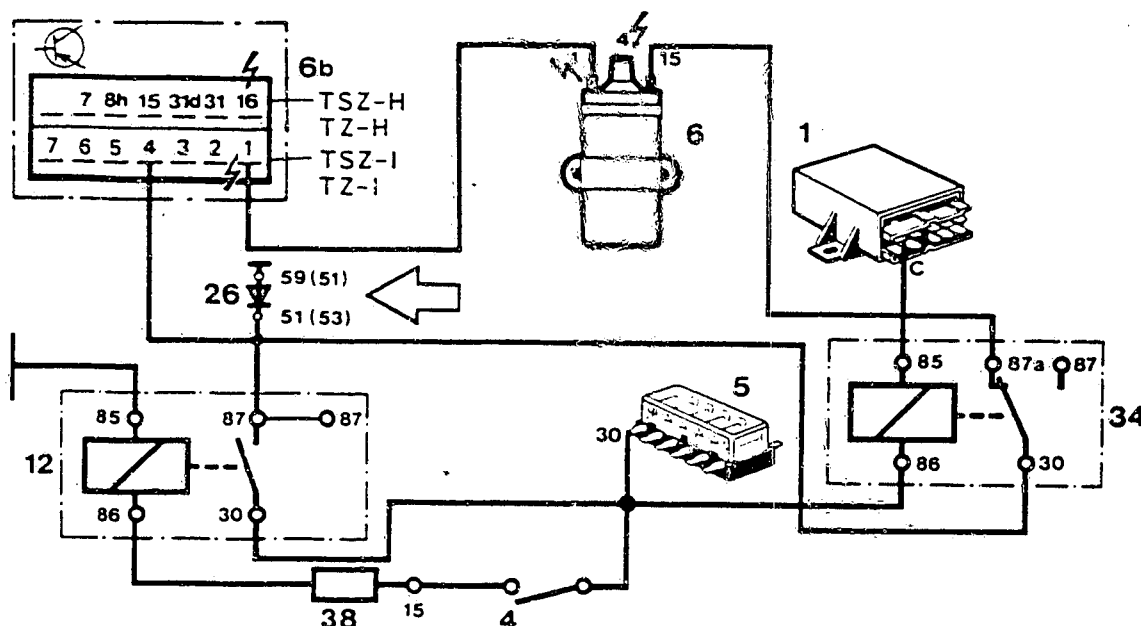
Description of the circuit with:

- retrofitted TCI-h, TI-h, if the resistance cable (38) remains in the vehicle, and if a relay (12) has already been fitted for controlling the positive current to the TCI/TI trigger box (6b) and the ignition coil (6).

Open-circuit the line between terminal 87 and both relay (12) and ignition coil (6), terminal 15 with an additional relay (34).

A protecting diode (26) must also be wired between relay (12) terminal 87 and ground.

The additional relay is controlled via terminal "C" of the alarm relay.



- 1 = Alarm relay
- 4 = Ignition-and-starting switch
- 5 = Fuse box
- 6 = Ignition coil
- 6b = Trigger box (TCI-h/TI-h, TCI-i/TI-i)

- 26 = Protecting diode 0 212 911 001
- 34 = Additional relay 0 332 204 150 (change-over contact, here as NC-contact)
- 38 = Resistance cable (in vehicle wiring harness)

Please note: As from date of manufacture 832 the terminal designations of the protecting diode (26) have been changed (see arrow). Old designations in brackets.



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DETERMINATION OF THE TEMPERATURE VALUES
GIVEN IN L-JETRONIC MANUALS

VDT-I-280/108 En
5.1982

We have recently been asked with increasing regularity how accurately the engine temperature must be measured when trouble-shooting on the vehicle.

So far in its L-Jetronic manuals KH/VSK has given three or four different temperatures for testing the temperature sensor:

-10 °C, +20 °C, +40 °C and +80 °C,

and two ranges for the thermo-time switch e.g. 35 °C 8 sec.

below +30 °C and above +40 °C.

Since the temperature range need not be subject to such close tolerances, we propose in future the following more appropriate definition:

- Ambient temperature (approx. +15 °C to +30 °C)
- Engine at normal operating temperature (approx. +80 °C).

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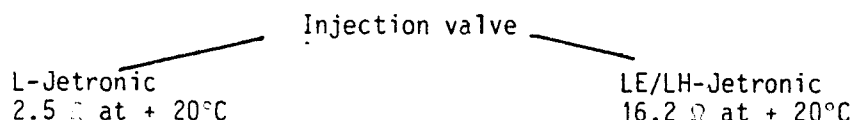
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CODING OF LE/LH-JETRONIC
SOLENOID-OPERATED INJECTION VALVES

VDT-I-280/109 En

5.1982

With the introduction of the LE/LH-Jetronic the internal resistance of the solenoid-operated injection valves has also been changed.



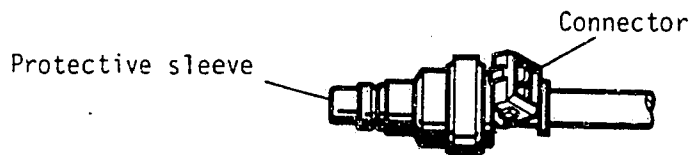
The connector has been left the same for cost reasons and to meet customer wishes.

Caution!

If L-Jetronic injection valves are installed in an LE/LH-Jetronic vehicle, either the control unit or the injection valves will suffer irreparable damage.

Note:

- Install only injection valves with the part number designated for the vehicle.
- As a guide, injection valves with 16.2 Ω internal resistance have a yellow protective sleeve.



- A colour coding (yellow) of the connector (see also VDT-I-280/5) is not generally intended for LE/LH-Jetronic injection valves.

Please direct questions and comments concerning the contents to our authorized representative in your country.

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PLUG-AND-SOCKET CONNECTORS FOR JETRONIC COMPONENTS

Parts sets

VDT-I-280/111 En

11.1982

(Replaces Ed. 7.82)

Parts sets are available for replacement Jetronic plug-and-socket connectors. The parts sets comprise:

- Connector housing
- Protective cap (rubber sleeve)
- Contact springs

These parts sets are listed on microfiche EE...*.

* See microfiche EE00 under 0 280 ..

- Plug, black, 2-pin, parts set 1 287 013 002 cable connector in conjunction with socket, 2-pin

- Socket, black, 2-pin, parts set 1 287 013 001 for e.g.:

Temperature sensor	0 280 130 0..
Auxiliary-air device	0 280 140 ..
Thermo-time switch	0 280 130 2..
Start valve	0 280 170 ..
Warm-up regulator	0 438 140 ..

- Socket, grey, 2-pin, parts set 1 287 013 003 for:

Solenoid-operated injection valve 0 280 150 ..

- Socket, black, 3-pin, parts set 1 237 000 039 for:

Throttle-valve switch 0 280 120 ..

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- Socket, black, 5-pin, parts set 1 287 013 066 for
Air-flow sensor 0 280 20. ... (LE-Jetronic)
- Socket, black, 6-pin, parts set 1 287 013 004 for
Air-flow sensor 0 280 200 ...
- Socket, black, 7-pin, parts set 1 287 013 005 for
Air-flow sensor 0 280 20. ...
Air-flow sensor 0 280 211 ...

The contact springs (minitimer) can also be supplied separately under Part No. 1 284 477 026.

The connector housings are only available in the stated colours.

Please direct questions and comments concerning the contents to our authorized representative in your country.



After-sales Service

Motor Vehicle Service Information

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UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En

1.1982

1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

2. Delivery dates and Part Numbers

Available as from 2.1982.

2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 1 engines as from 9.1981, and for Opel 2.0 1 engines (Manta/Rekord) as from 9.1981.

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2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124

First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

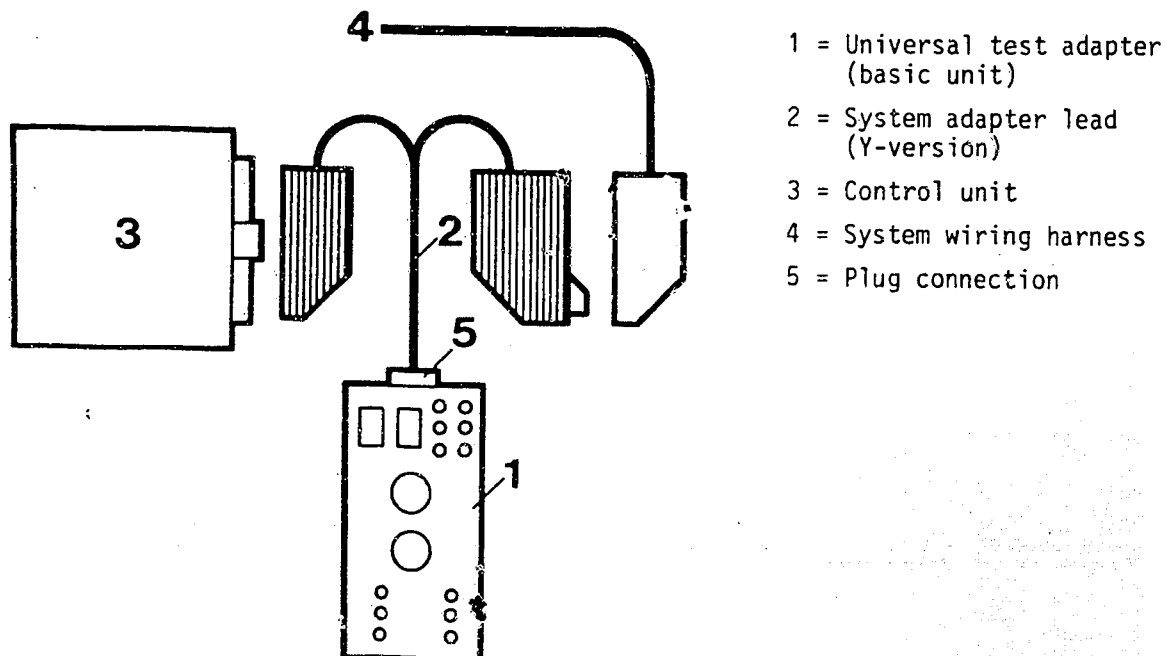
3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

3.1 Adapter lead for peripheral and function testing (Model 1)

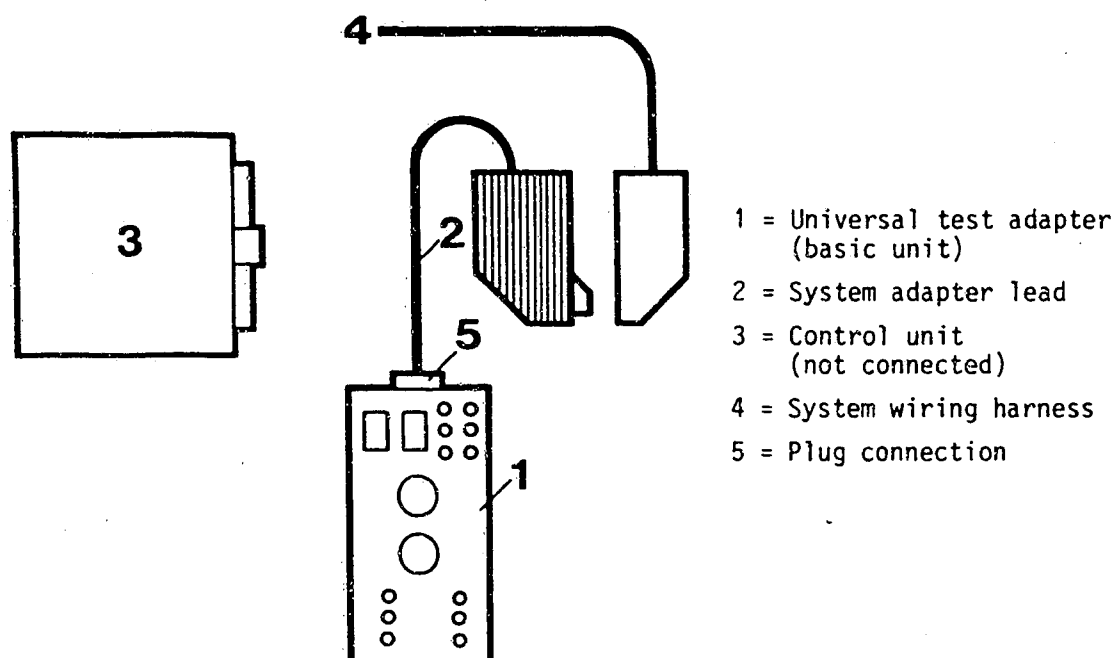
The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).
To be tested: Wiring harness with components and control unit.



3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

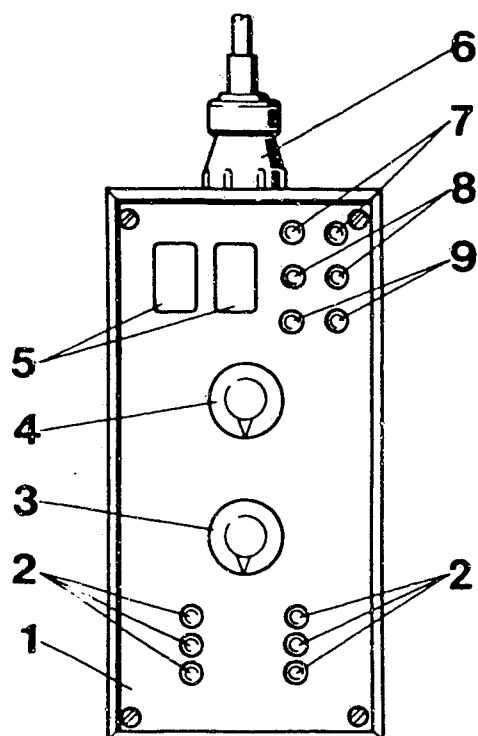


4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches footlage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.





- 1 = Universal test adapter (basic unit)
- 2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.
- 3 = Program switch "Ohm" for resistance measurement
- 4 = Program switch "Volt" for voltage measurement
- 5 = Measurement "cavities" (for the special input from the Motortester)
- 6 = 63-pole plug-in connection for connecting the system adapter lead
- 7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)
- 8 = Measurement sockets (resistance measurement with the multimeter)
- 9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).
2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/J22 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123



After-sales Service

Motor Vehicle Service Information

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EXPORT VEHICLES WITH

EMISSION CONTROL SYSTEMS

VDT-I-Gen. 042 En.

12. 1981

K-Jetronic and L-Jetronic

Export vehicles for countries with stringent exhaust emission regulations are equipped with various emission control systems. To meet the legal requirements, these systems are installed either individually or in combination, depending on the model version.

Emission control system	installed predominantly in export vehicles				
	Sweden	Australia	Canada	USA	Japan
Exhaust-gas recirculation*	•	•	•	(•)	(•)
Secondary-air induction*	•	•	•	(•)	(•)
Secondary-air injection*	•	•	•	(•)	(•)
Catalytic converter*	-	-	-	•	•
Lambda closed-loop control	-	-	-	•	•

The vehicle-related After-Sales Service Instruction Manuals for the K-Jetronic and L-Jetronic describe the construction, function and operating principle of the emission control systems. The influence of these systems should be borne in mind particularly when adjusting the idle speed and CO concentration.

Export vehicles are sometimes also encountered in countries which do not have particularly stringent exhaust emission legislation. This Service Information publication summarizes the various emission control systems and provides information for the After-Sales Service in countries with exhaust emission legislation which does not require such emission control systems or unleaded fuel.

* Not made by Bosch

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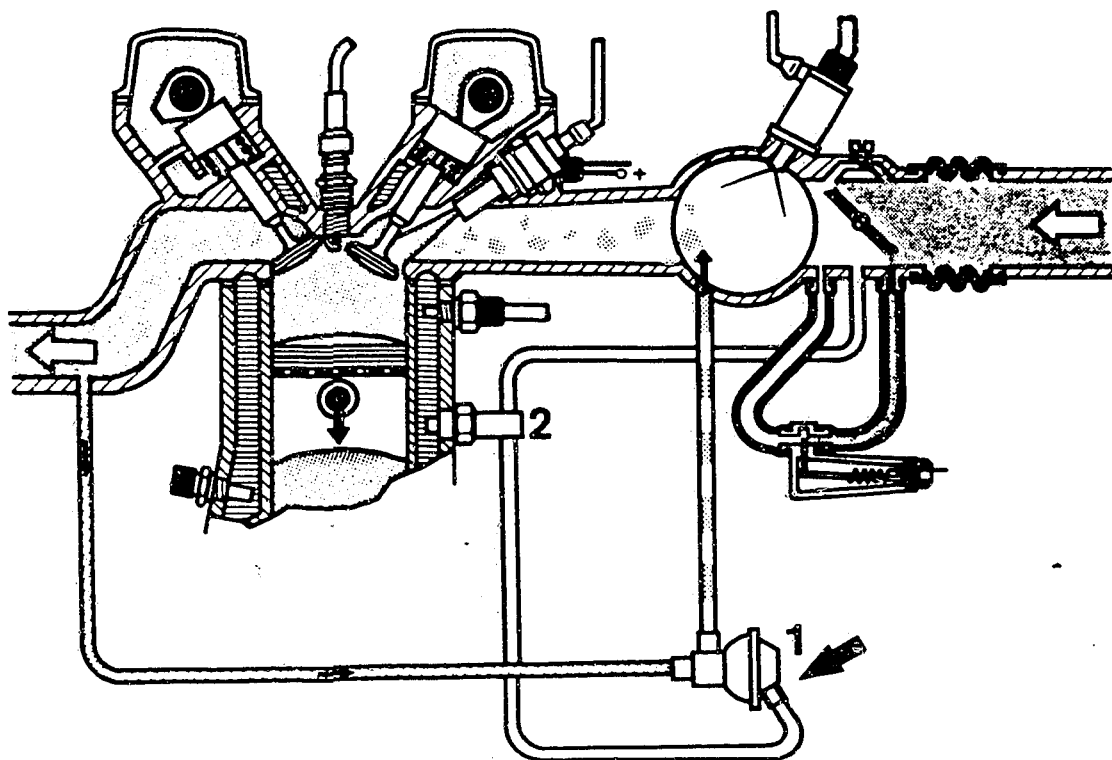
L14

Motor Vehicle Service Information

Opel Senator, Monza 3.0 E



1. Exhaust-gas recirculation (EGR)



1 = Exhaust-gas recirculation valve 2 = Thermo-valve

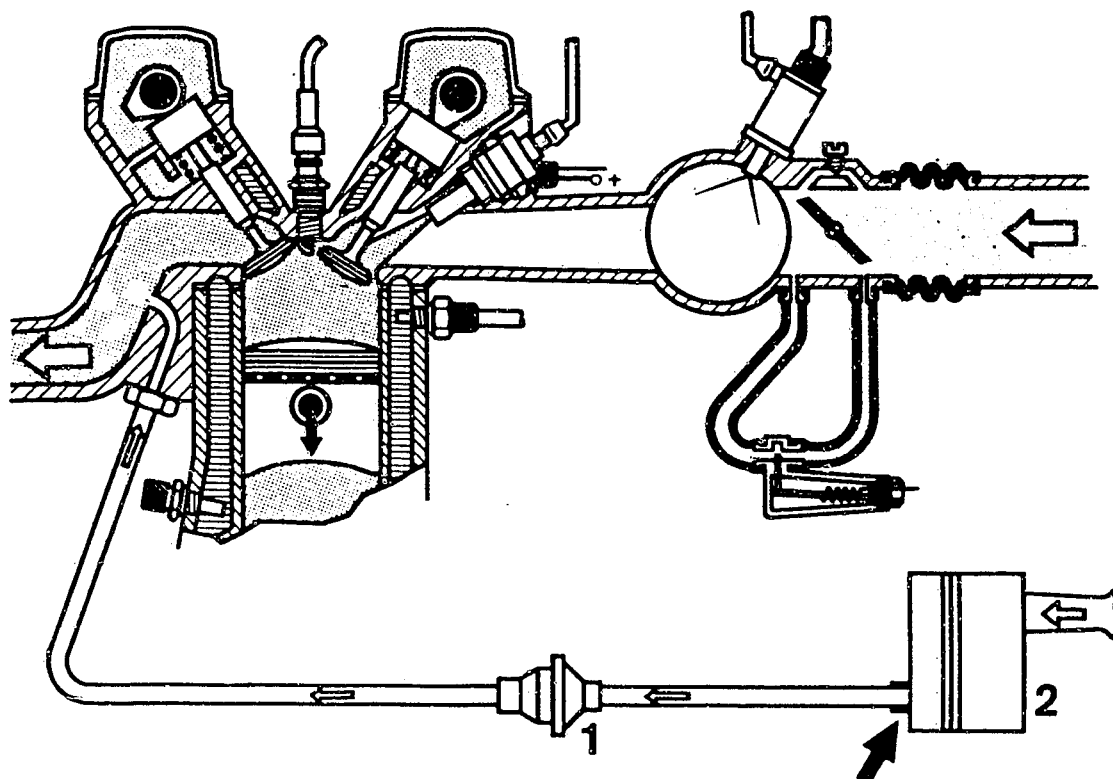
Some of the exhaust gas is returned to the intake manifold via a vacuum-controlled exhaust-gas recirculation valve. This recirculation of exhaust gas into the combustion chamber lowers the combustion temperature and reduces the emission of nitrogen oxides (NO_x). The thermo-valve and the position of the vacuum tapping port on the throttle-valve assembly ensure that exhaust gas is only recirculated when the engine is warm and only at part load. There is a reduction in engine speed of about 200 min⁻¹. Exhaust-gas recirculation is inoperative at idle, full-load and when the engine is cold.

When testing or adjusting the idle speed and CO concentration, remove and seal off the vacuum control line (arrow) on the exhaust-gas recirculation valve in order to ensure that the exhaust-gas recirculation system is inoperative.

In countries without stringent exhaust emission legislation it is not necessary to shut down the system.



2. Secondary-air induction (e.g. Volvo Pulsair system)



1 = Non-return valve

2 = Air filter

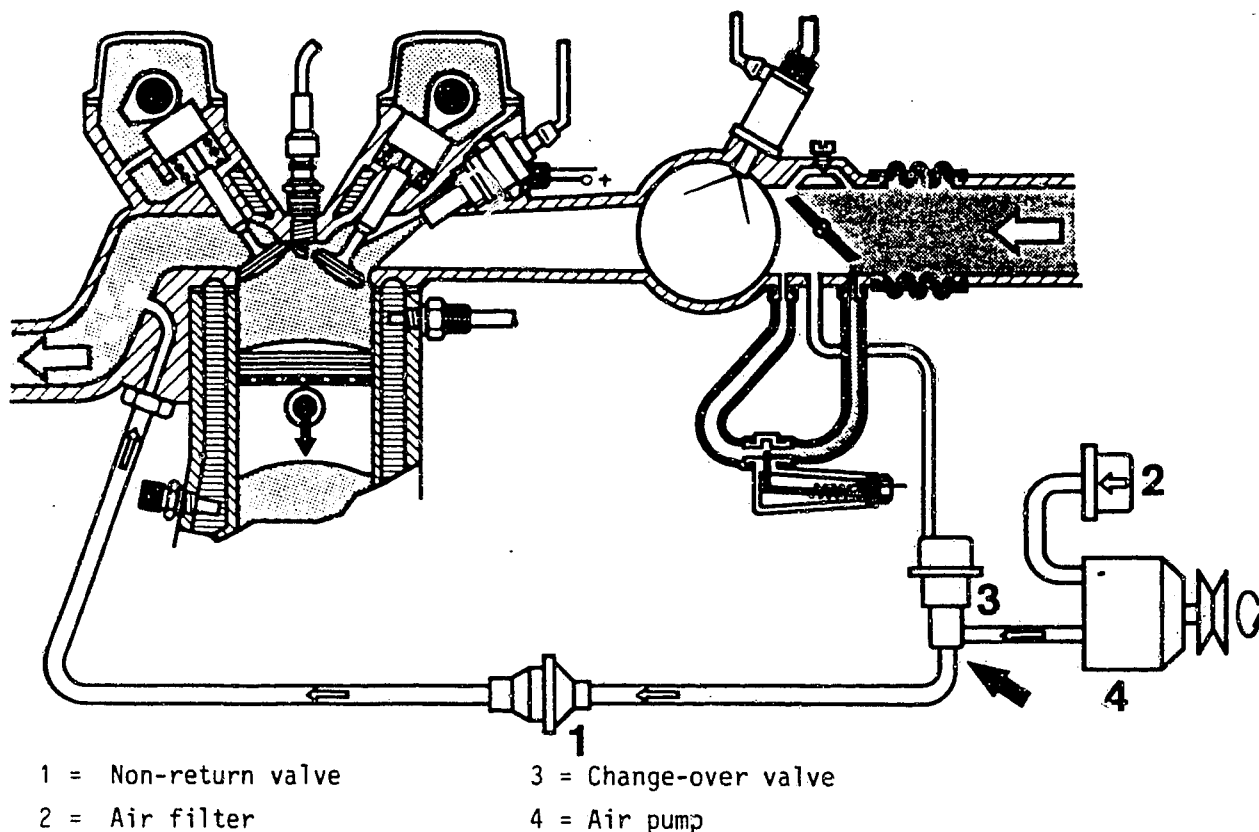
The pulsating alternation between overpressure and depression in the flow of exhaust gas inducts fresh air into the exhaust ports via a non-return valve. Unburned residues of carbon monoxide (CO) and hydrocarbons (HC) are partially after-burned, leading to fewer pollutants in the exhaust gas.

When testing or adjusting the idle speed and the CO concentration, the secondary-air induction system must be rendered inoperative. To do this, remove the hose between the non-return valve and the air filter on the air filter (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air induction system.



3. Secondary-air injection



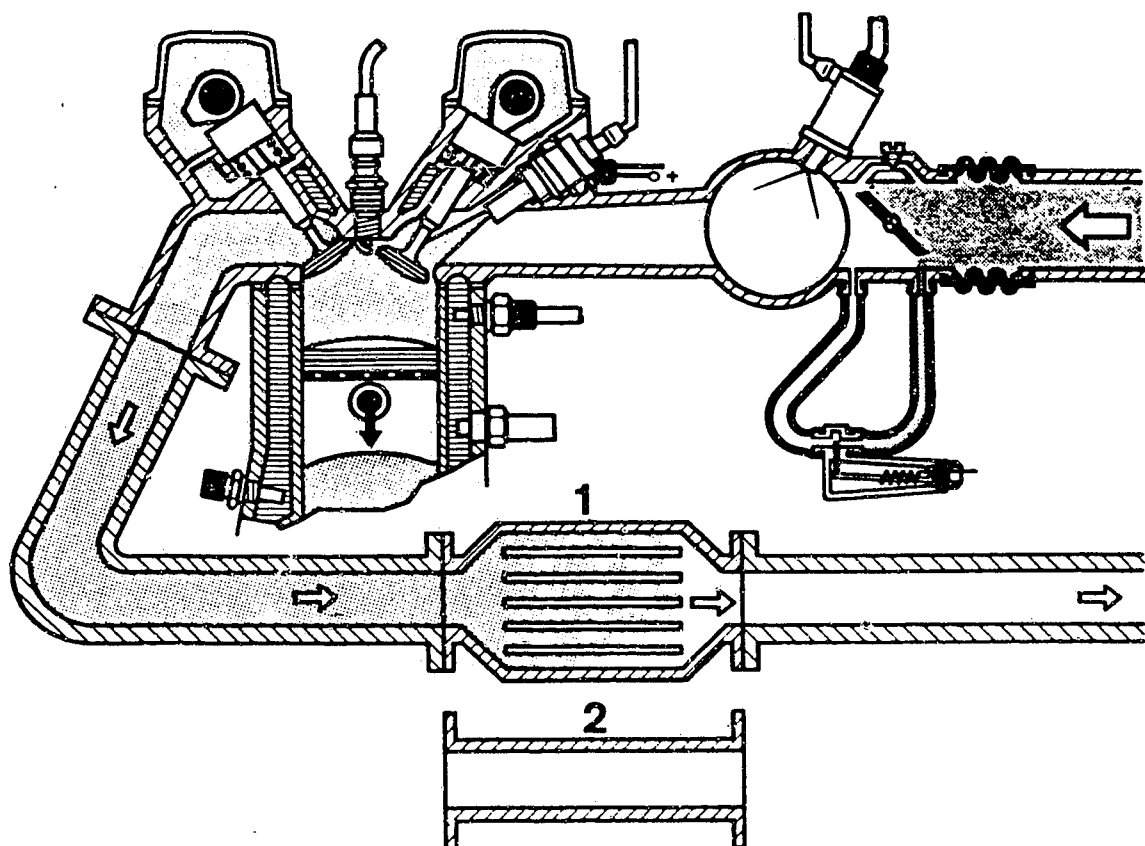
An air pump driven by the engine inducts fresh air through the air filter and forces it via a non-return valve into the exhaust ports. As in the case of secondary-air induction, there is a partial after-burning of the CO and HC residues. This makes the exhaust gas cleaner. A vacuum-controlled change-over valve controls the operation of the secondary-air injection system.

When testing or adjusting the idle speed and the CO concentration, shut down the secondary-air injection system. To do this, remove the hose from the outlet of the change-over valve (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air injection system.



4. Catalytic converter



1 = Catalytic converter

2 = Intermediate pipe

The single-bed catalyst installed in the exhaust system in export vehicles (also with lambda closed-loop control) reduces all three pollutants CO, HC and NO_x to a minimum. The catalytic surface triggers chemical reactions of the pollutants, rendering them non-toxic.

Important: Proper operation only possible in conjunction with unleaded fuel (at present only in USA and Japan).

When testing or adjusting the idle speed and the CO concentration, the catalytic converter can be neglected since the exhaust-measuring point is upstream of the catalyst.

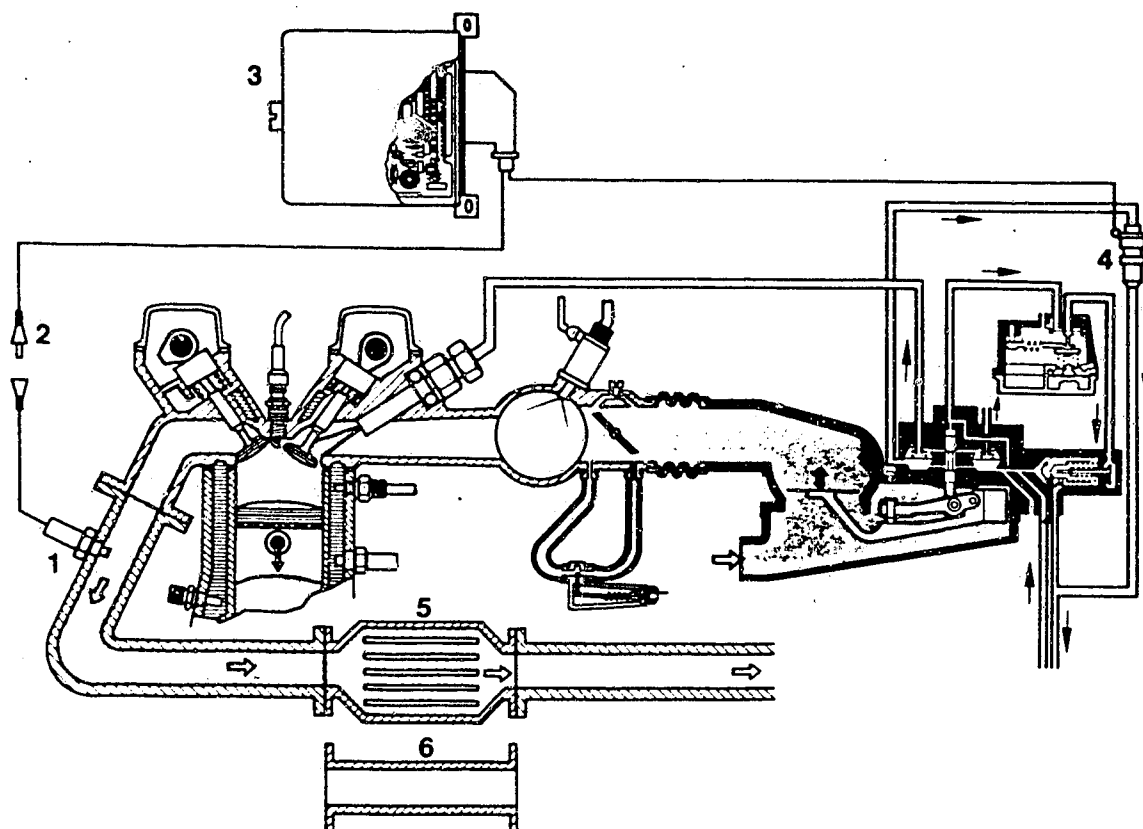
Caution!

If the vehicle is operated on leaded fuel (predominantly in countries without stringent exhaust emission legislation) the catalytic converter must be removed. If not removed, the catalytic converter would become clogged up and lead to a reduction in the power output of the engine.

Appropriate intermediate pipes for converting the exhaust system are available from the vehicle manufacturer.



5. Lambda closed-loop control



1 = Lambda sensor
2 = Plug

3 = Control unit
4 = Timing valve

5 = Catalytic converter
6 = Intermediate pipe

Export vehicles for the USA and Japan are equipped with lambda closed-loop control. This additional function of the K-Jetronic or L-Jetronic is not a downstream emission control system, but ensures a low pollutant content in the exhaust gas by means of optimum mixture preparation. Additional exhaust-gas recirculation, secondary-air induction or secondary-air injection is therefore not necessary in most cases. Like the catalytic converter, the lambda sensor (in the exhaust gas) operates only with unleaded fuel.

If the vehicle is operated on leaded fuel, the lambda sensor becomes clogged up and ceases to operate. The control unit detects this and switches from closed-loop to open-loop control. The system then operates on a fixed air-fuel ratio in the same manner as a K-Jetronic or L-Jetronic without lambda-closed-loop control. Before operating on leaded fuel, the lambda sensor should be removed and the installation hole should be closed off with a screw plug M18x1.5 (length of thread max. 8.5 mm). The disconnected plug (2) of the sensor connecting cable should be insulated and fastened to a suitable place on the vehicle body.

Caution!

Under no circumstances must the control unit or the timing valve be shut down on the lambda closed-loop control of the K-Jetronic.

The catalytic converter should be replaced by an intermediate pipe.

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After-Sales Service Department
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(KH/VSK)



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